Gas Journal

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TECHNOLOGY DEPT.

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- Diaphragm Type with relay control.
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- Running cost nil.
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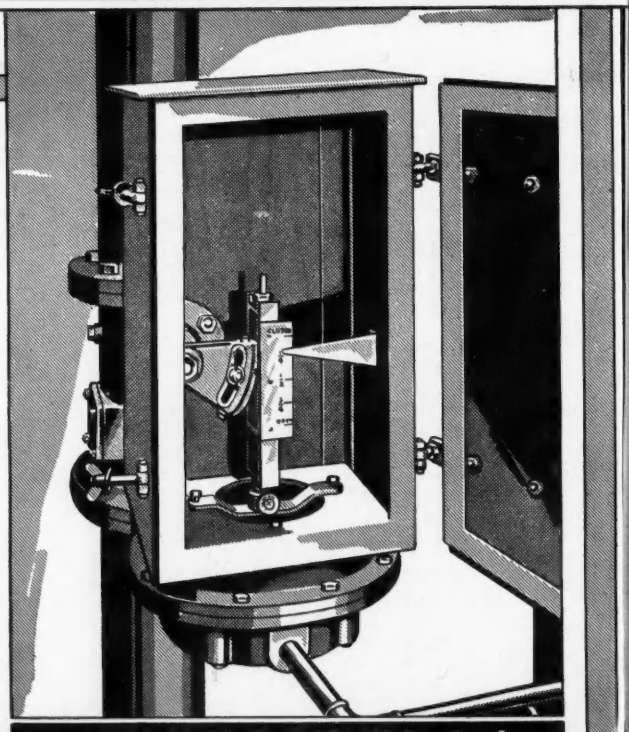

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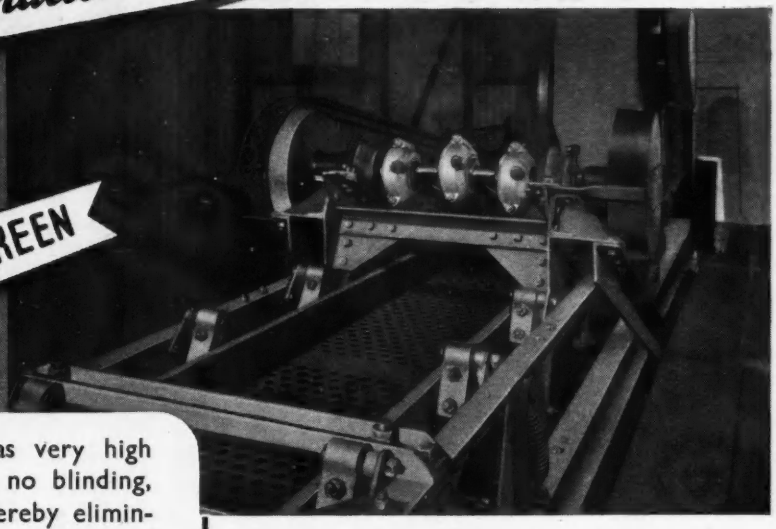

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A

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COMBUSTION SAFEGUARD SYSTEM

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Instantaneous fuel shut-off on flame failure . . . complete protection against internal faults . . . push-button, electric ignition . . . flexibility of design to permit incorporation of temperature or limit controls if required . . . these are the outstanding features of the Protectoglo combustion safeguard system installed on numerous gas-fired furnaces, ovens, lehrs, etc., throughout the country. Full details of an installation to suit your particular requirements will be sent on request.

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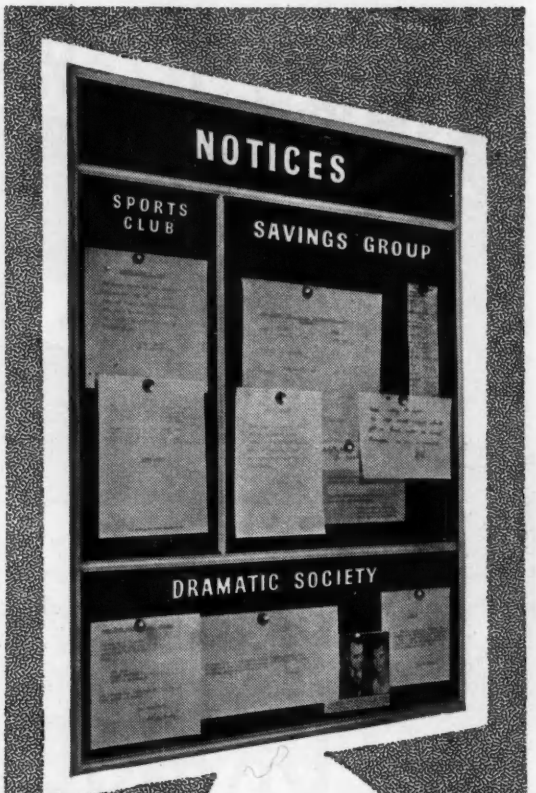

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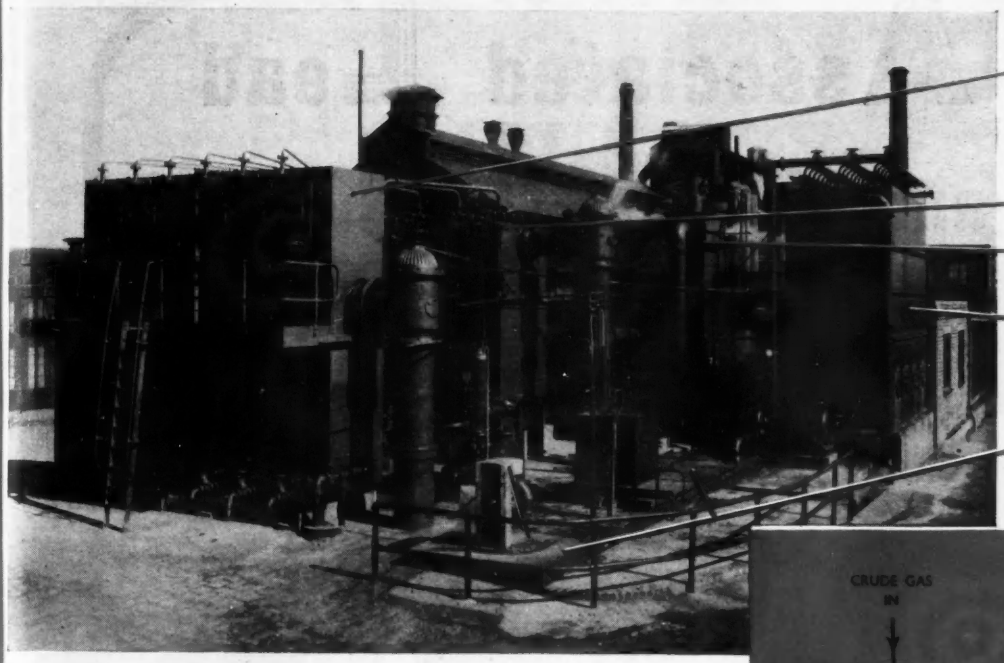
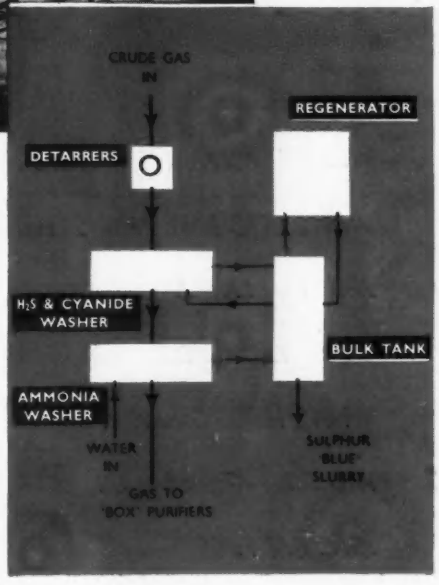
NEW DEVELOPMENTS IN GAS PURIFICATION PLANT





A partial H_2S removal plant built by us for a gasworks in the north-west of England has been in operation for several months. The cost of the final "dry box" purification has been reduced and recent experiments have revealed the possibility of producing commercially pure sulphur and also prussiate of soda solution. Further information is available on request.

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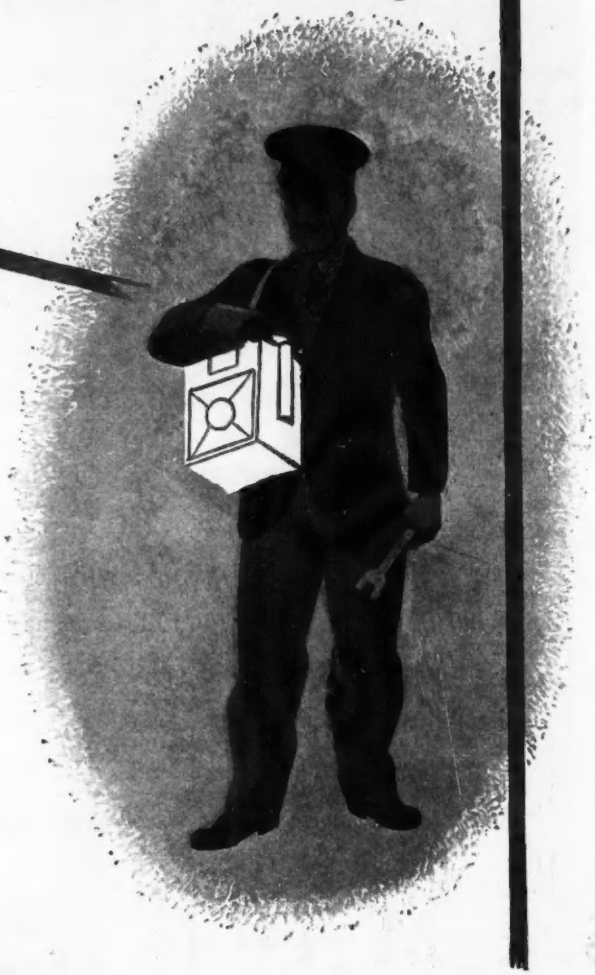

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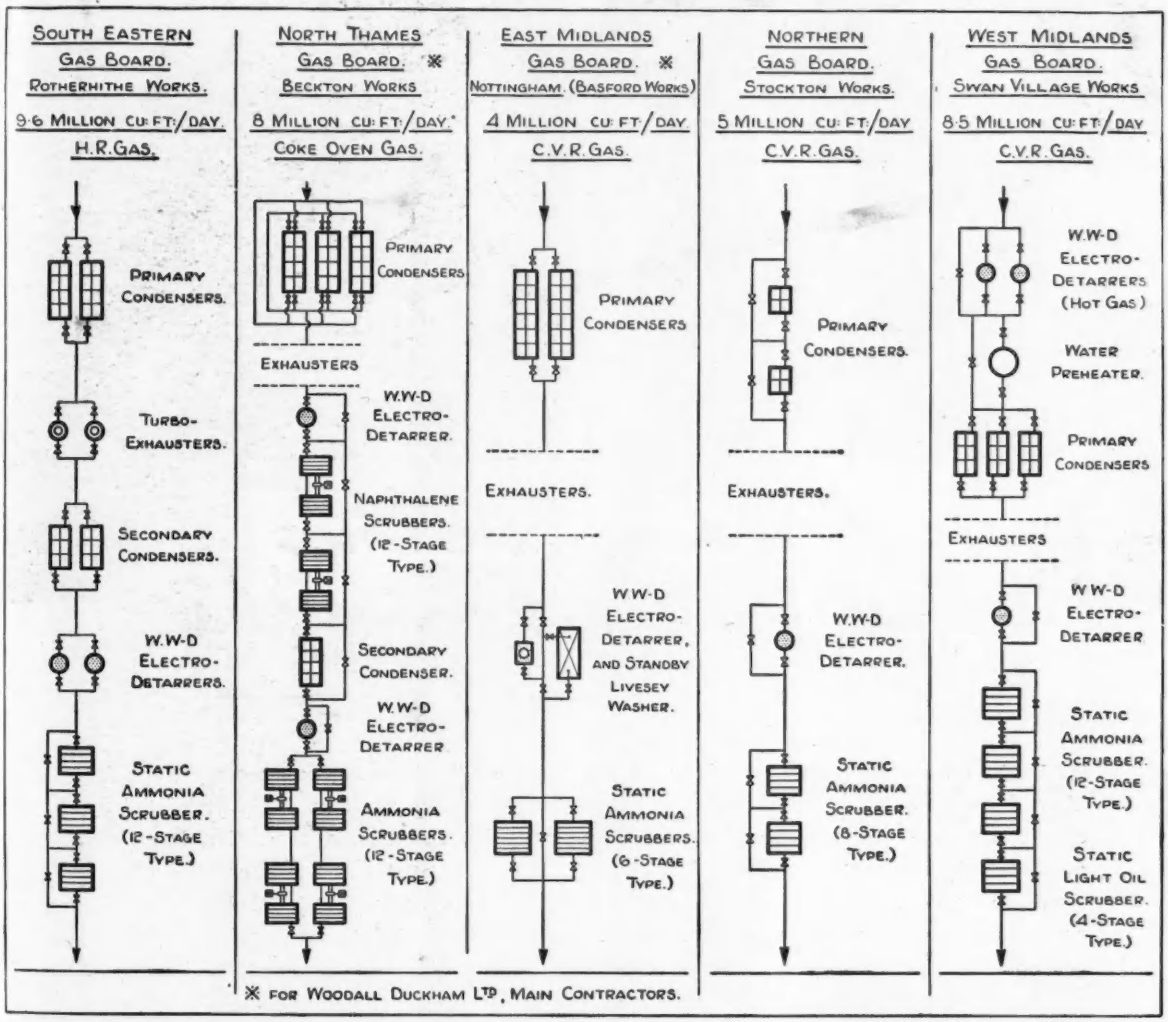
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STATIC AMMONIA SCRUBBERS. (6-STAGE TYPE.)
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W.W-D ELECTRO-DETARRER.
STATIC AMMONIA SCRUBBER. (8-STAGE TYPE.)
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WATER PREHEATER.
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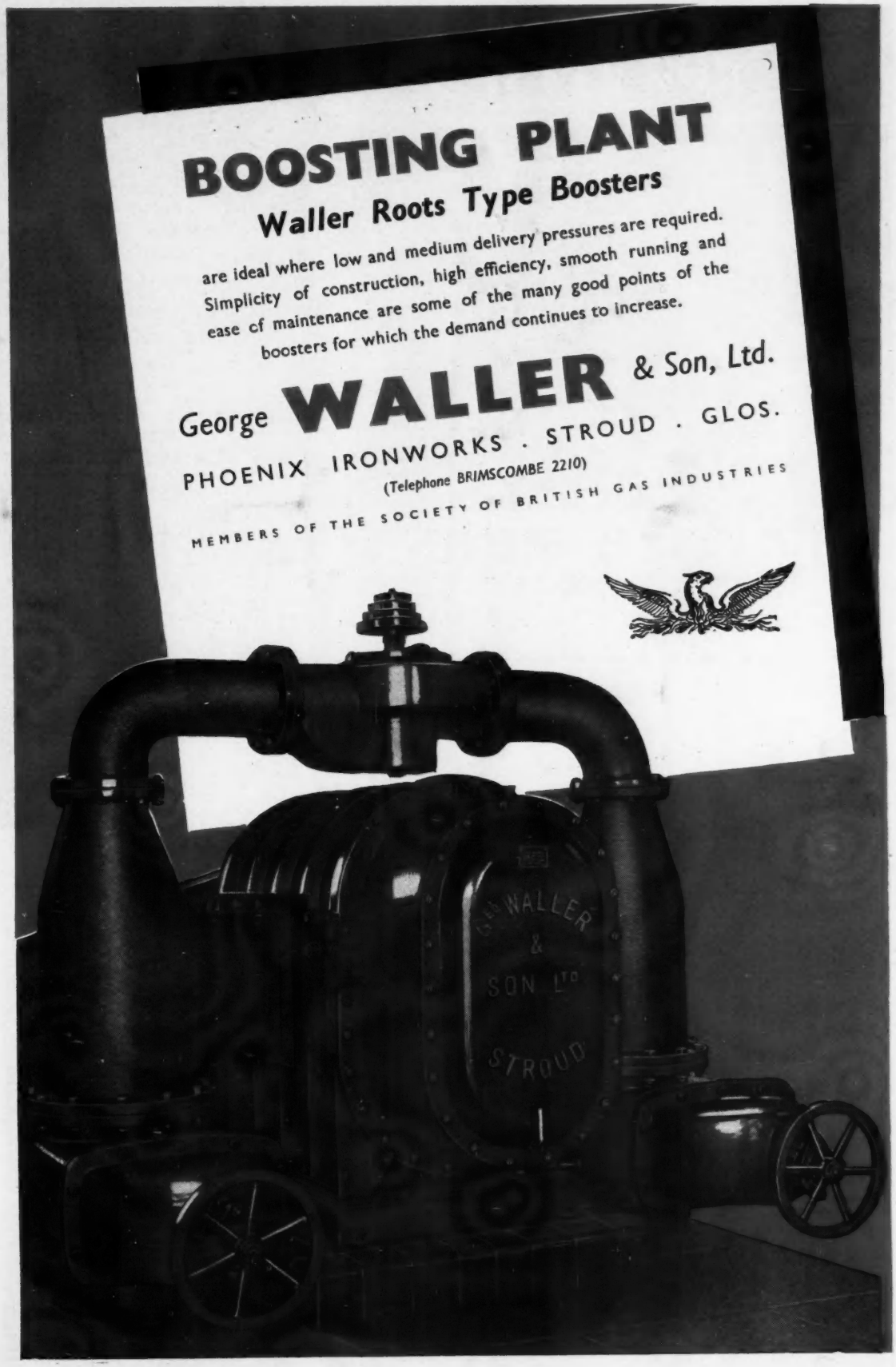
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are ideal where low and medium delivery pressures are required. Simplicity of construction, high efficiency, smooth running and ease of maintenance are some of the many good points of the boosters for which the demand continues to increase.
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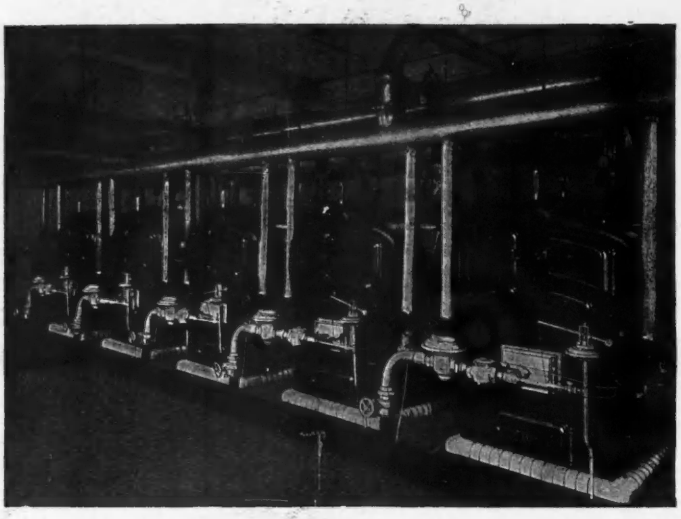

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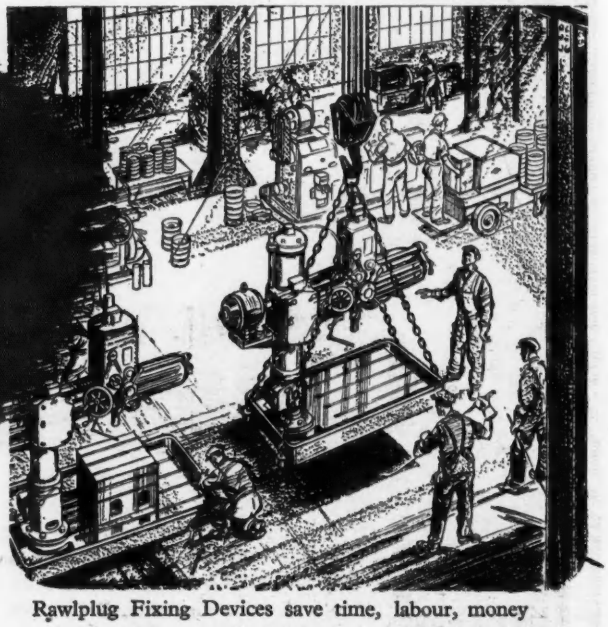

MORE POWER, more plant, more work, more production. All over the country new machinery moves into place, new structures go up. Rawlplug Fixing Devices are being used in their millions. Rawlbolts for heavy duty fixings; Rawlanchors and Rawlplug Spring and Gravity Toggles for fixing thin and hollow materials; and the all-useful Rawlplug for every conceivable attachment in factory and office.

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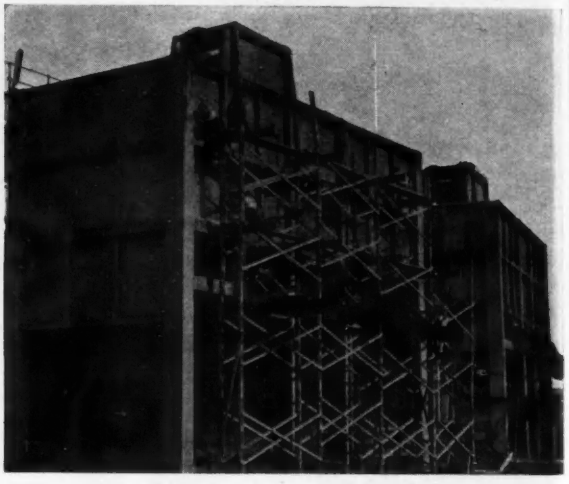
Makers of letter-opening, envelope-sealing, coin-counting and token-counting machines

Gunite



One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking.

Gunite—concrete applied by air pressure has numerous applications where its great density and extreme adhesion have exceptional value.

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For lining coal bunkers and steel chimneys it possesses great resistance to corrosion and protects steel-work from the abrasive action of coal or coke

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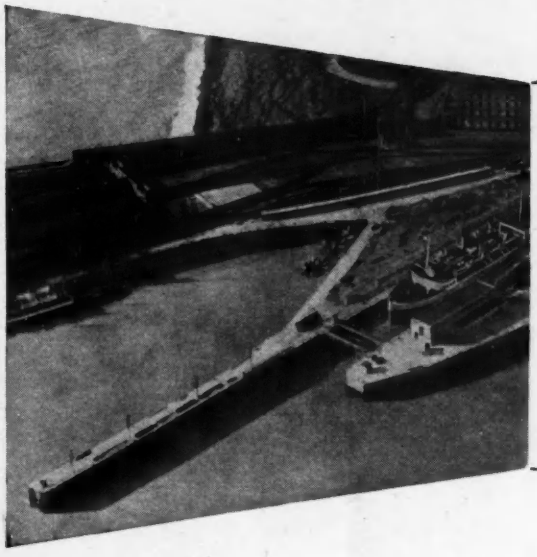

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Dover is one of the few junctions in the world where trains put to sea. An ingenious lock-gate installation allows trains to pass smoothly on to ferry ships which carry them to Dunkerque, where they continue the rail journey. The Night Ferry system, providing a completely undisturbed trip between London and Paris, is an important link between this country and the Continent : in 1948 the three ships in service carried trains with over 100,000 passengers, together with 11,000 private cars and a great deal of export and import goods.

In all types of private and public buildings on land, as well as in ships and liners at sea, **GF** Malleable Iron Fittings make reliable, leak-proof pipe junctions in water, gas, steam or air pipe-lines.

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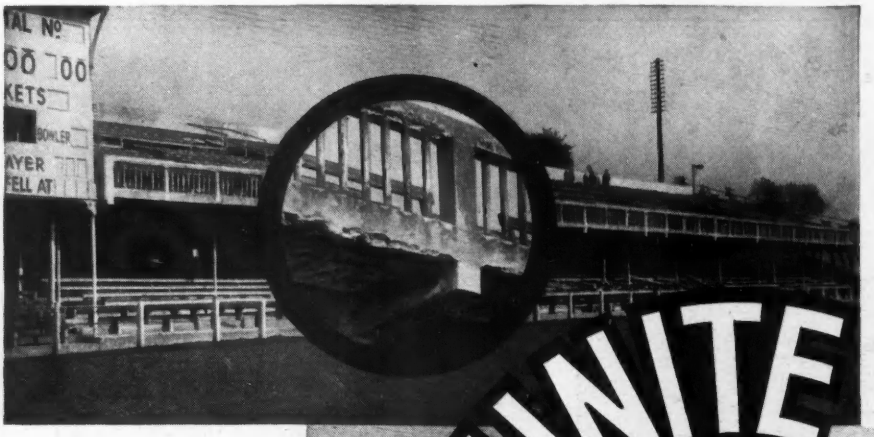

GUNITE REPAIRS to the Grandstand at 'Trent Bridge.' Before and after treatment.

Estimates given for encasing structural steelwork and covering the wearing surface of chutes and bunkers.

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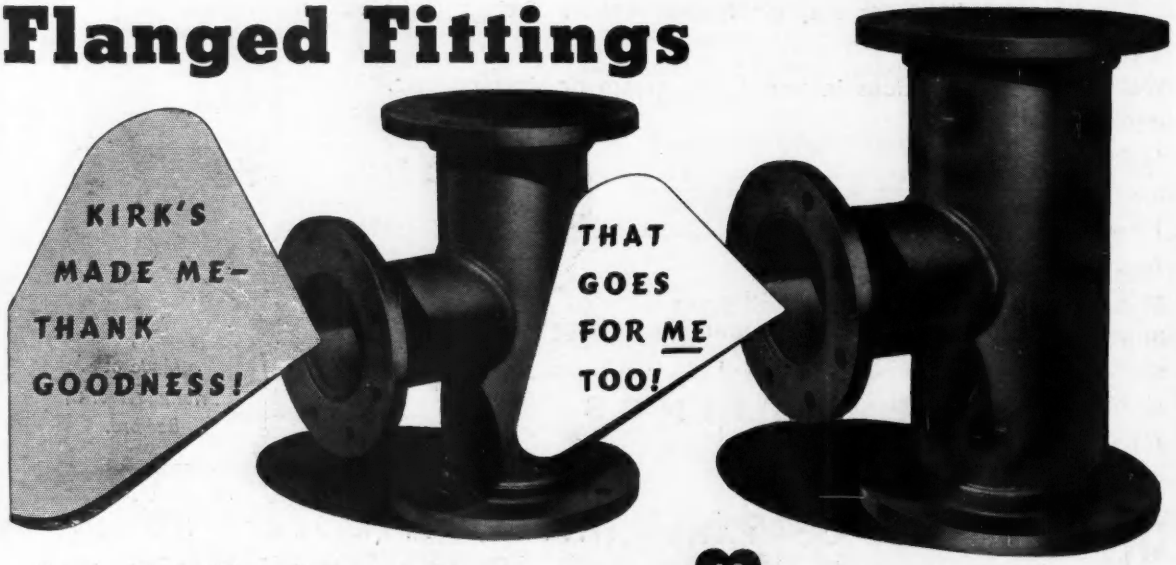

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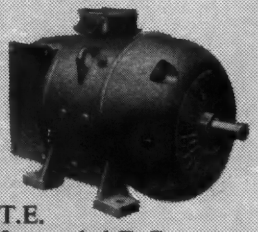
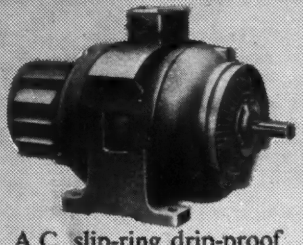
and Control Gear

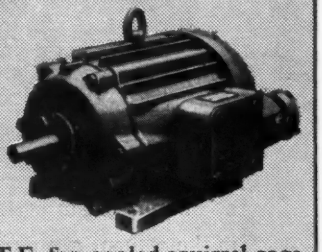
A.C. squirrel-cage induction motor (die-cast frame)



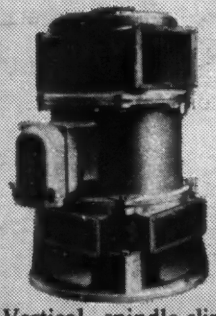
T.E. fan-cooled D.C. motor



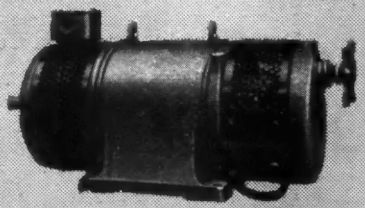
A.C. slip-ring drip-proof motor.



T.E. fan-cooled squirrel-cage flameproof motor.



Vertical spindle slip-ring induction motor



A.C. variable-speed commutator-motor

BTH is particularly well placed to meet the needs of Industry for electric equipment in general—D.C. and A.C. (single or polyphase) motors and associated control gear in particular. Present day production represents the results of over fifty years' continued progress in original research, design, and manufacture, of all types and sizes of rotating electric machines—second to none in performance and reliability.

No manufacturer can offer a wider choice in electric motors. Whatever the conditions of service or type of drive there is a BTH motor well suited to the job.

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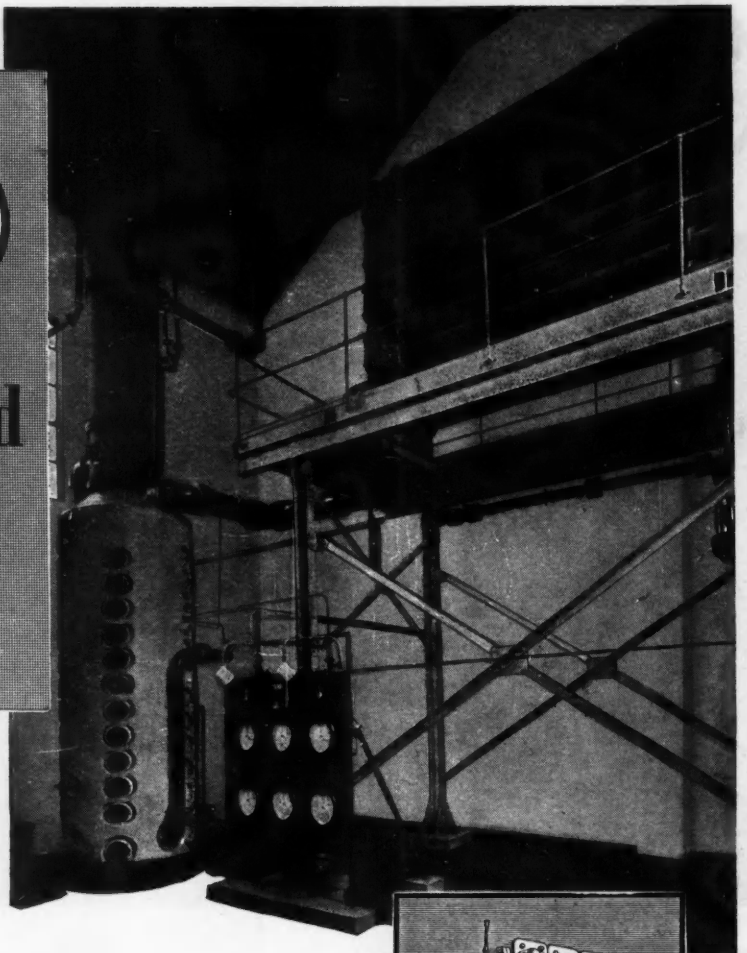
THE BRITISH THOMSON-HOUSTON CO., LTD., RUGBY, ENGLAND

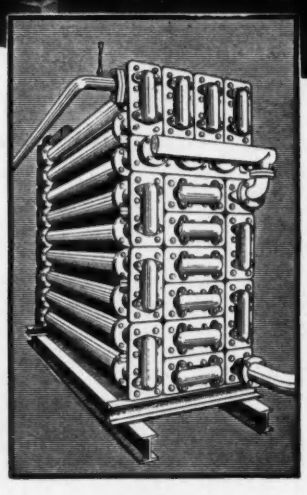
A3963

Wilton

Concentrated Ammonia Plant



(Inset Below)
Multi-tubular Preheater Condenser



As a result of long experience, Wilton Concentrated Ammonia Plants have proved highly successful, not only in the consistency of their output, but in economy of operation. Steam costs are exceptionally low and ammonia in the effluent can be reduced to .01%.

Guarantees are afforded to produce concentrated liquor from 18—25%, according to requirements.

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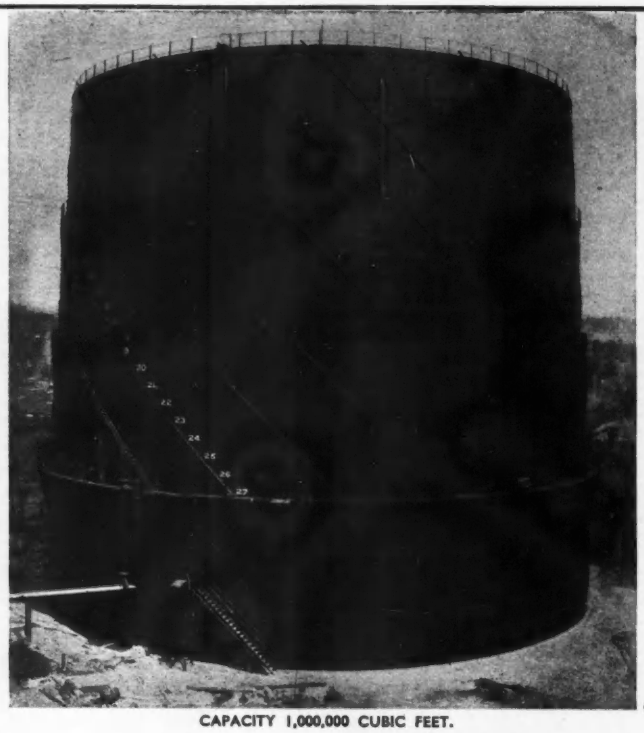

CAPACITY 1,000,000 CUBIC FEET.

17

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Scientists will tell you that over 30,000 foot-pounds of energy are required to raise a hundredweight of solid fuel from the ground floor to the second storey of a block of flats .... that is if the flats are of the out-of-date kind in which the fuel for heating water has to be humped upstairs, dust and all. Flat dwellers of the future will certainly not expect to inherit that inconvenience. More, they will resent being limited to 30 gallons or so of hot water at a time, whereas with an Ascot they could have an instant and inexhaustible supply. For these reasons far-seeing architects and local authorities are specifying Ascot Gas Water Heaters—which provide a hot water service in line with modern ideas.

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The Ascot technical department possesses wide experience of hot-water planning. Its officers are freely available for consultation.

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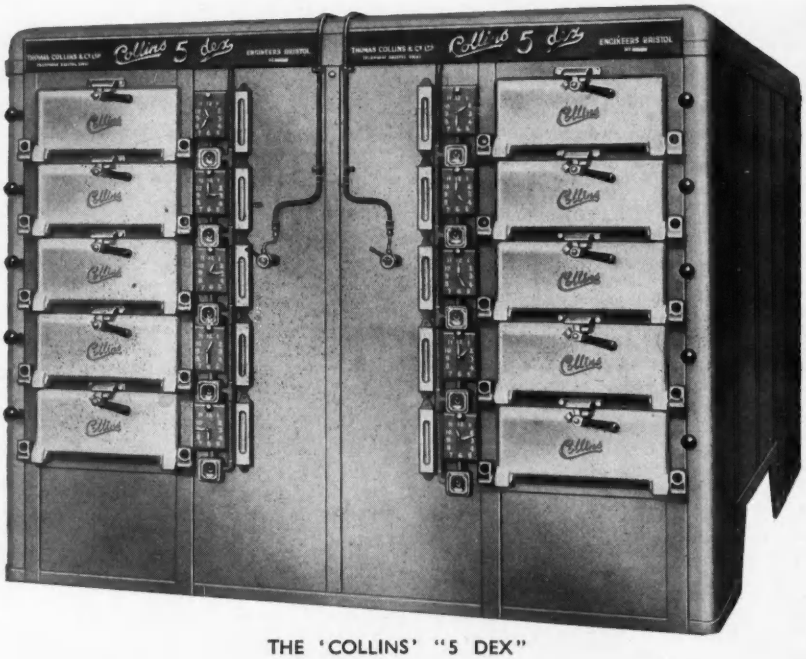

THE 'COLLINS' "5 DEX"

Technical assistance is available when required.

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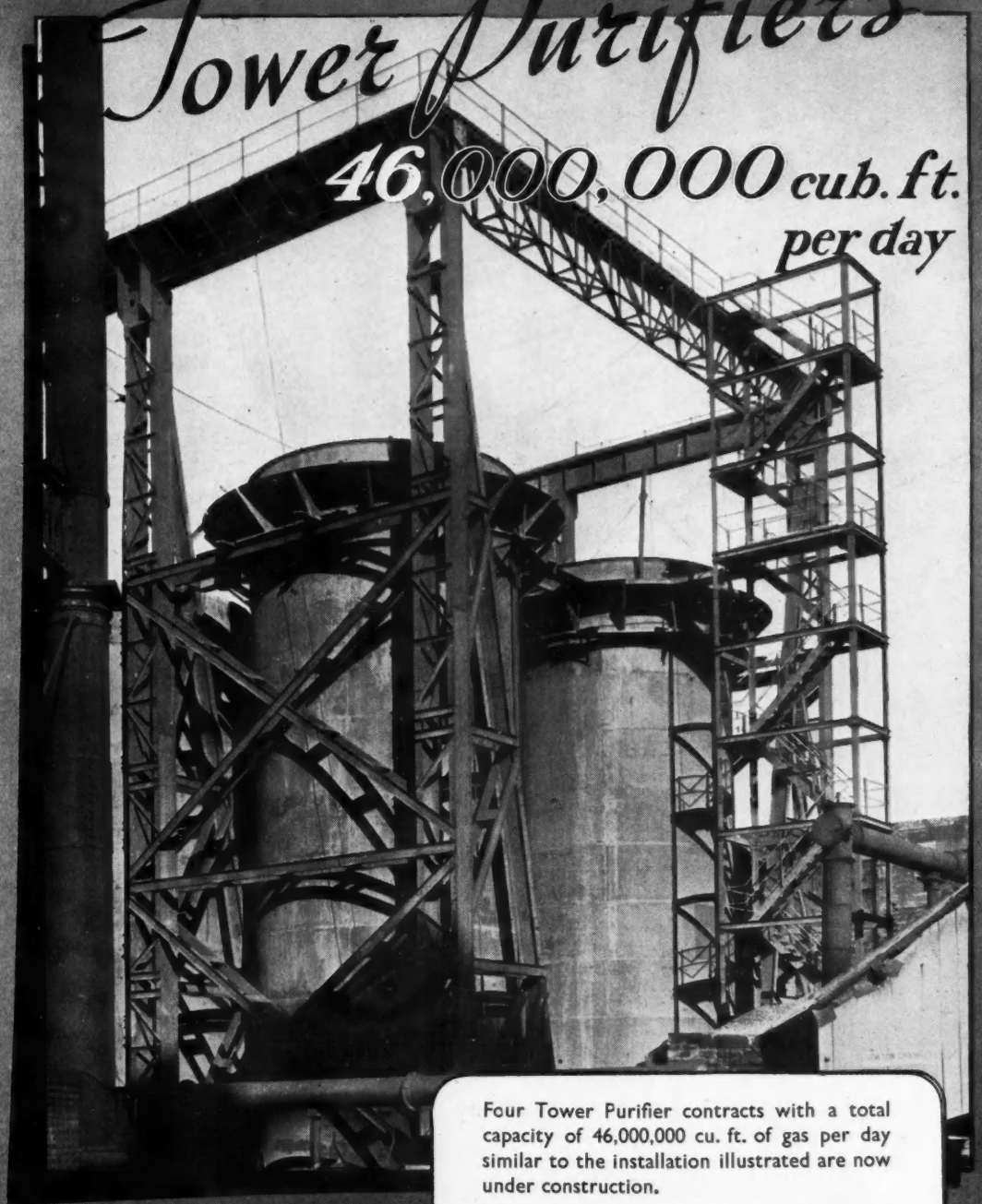
46,000,000 cub. ft. per day



Photograph by courtesy of the East Midlands Gas Board shows the installation in the course of construction at the Neepsend station of the Sheffield undertaking.

Four Tower Purifier contracts with a total capacity of 46,000,000 cu. ft. of gas per day similar to the installation illustrated are now under construction.

We invite your enquiries for purification plant of this type in all cases where ground space and labour are limited.

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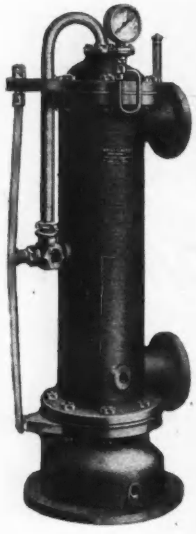

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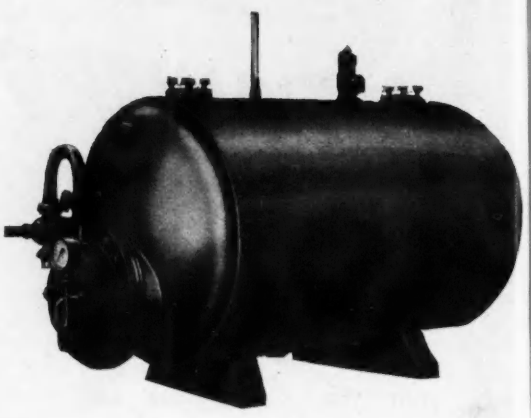
Efficiency, reliability and maintenance economy—three important reasons for always specifying Royles Calorifiers for space heating and hot water supply. Storage and non-storage types are available in a wide range of sizes, duties and alternative materials to meet all conditions in service.

Illustrated are :—(left) Non-Storage Calorifier with B.S.B. Automatic Steam Control and (on right) Dished End Storage Calorifier with Type H Automatic Steam Control.



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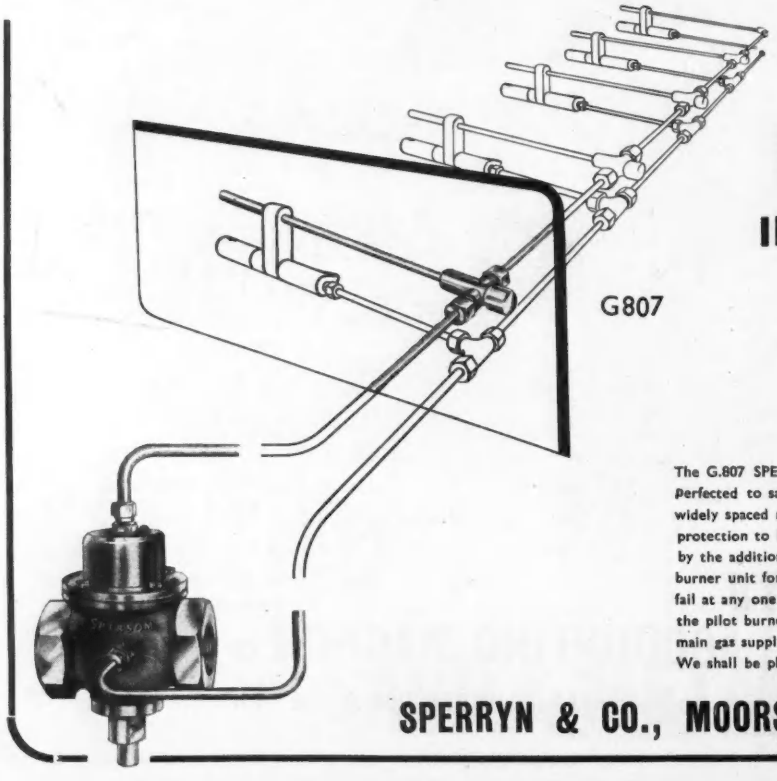

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The G.807 SPERSOM patented Multi-Safe Control has been designed and perfected to safeguard the innumerable installations in which two or more widely spaced non-interlighting burners are employed. This enables 100% protection to be achieved with a single thermo-magnetic Safe Control Pilot by the addition of one SPERSOM G.807 Multi-Safe Control and one pilot burner unit for each main burner. By utilising this system, should the flame fail at any one burner it will either be reignited by the pilot burner or, if the pilot burner has also failed, the G.807 Multi-Safe Control will cause the main gas supply to be cut off from the whole of the apparatus.
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Here is the latest Gas-Fired Incinerator produced by Sugg to take care of disposal problems quickly, safely, and *hygienically*. This new design (Model No. 3705), attractively finished in white enamel, is backed by 20 years' experience in the manufacture of 'personal' incinerators. The action of opening the incinerator door lights the burner. After burning for the pre-set period — between 3 and 120 minutes — the gas is *automatically* turned off, reducing fuel consumption to the minimum. The wall model allows extra floor space in small or narrow rooms. A pedestal model (No. 3706) of similar design is also available. An ever-increasing number of Hospitals, Nursing Homes, Factories, Business Houses, Stores and Schools are being equipped with Sugg Gas-Fired Incinerators.

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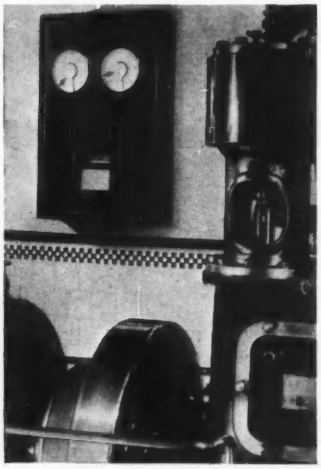

Evershed Indicators and the two-pen Recorder at Cambridge Gas Works.

Do you know Series 4?

If you have not yet had details of the new "Megger" Insulation Tester, Series 4, *send for Publication* G.J. 051/5 giving complete details of range and price.

Evershed Electronic Repeaters in Cambridge medium pressure system

Considerable economy in use of steam

Two Evershed Electronic Gas Pressure Transmitters and an Evershed indicator panel are incorporated in the medium-pressure distribution system on the Cambridge District Undertaking of the Eastern Gas Board. The system comprises two medium-pressure mains running north and south from the Works. The northern main terminates at Longstanton (8¾ miles distant) and the southern at Sawston (7¼ miles distant).

At the end of each of these mains are Reynolds governors feeding directly into the low pressure systems. The pressure maintained at the outlet of the compressor at Cambridge Gas Works varies between 1 and 10 lbs. per sq. in. dependent on the amount of gas being delivered through the medium-pressure system. The requisite pressure is determined by the need to maintain an adequate minimum pressure of 0.5 lbs. per sq. in. at the inlet to the governor at which there is the lower pressure.

Evershed Electronic Transmitters at Sawston and Longstanton are connected by Post Office lines to separate indicators and a two-pen recorder on the Evershed panel in the compressor house at the Cambridge Gas Works. The installation has enabled the Board to effect considerable economy in the use of steam, because by operating to a given pressure at the extremity of the medium pressure main, compressors can be run at a lower average speed, except at peak load periods, than was formerly the case. *Details of the Evershed Electronic Repeater are given in Publication No. G.J. 225.*

Evershed Telemeter measures Barry gas stock

The height of the 1½ million cubic feet spiral holder at the Verlons Holder Station of the Barry Gas Undertaking is always indicated in the works 3,000 yards away. An Evershed Telemeter installed on the holder, is connected by Post Office Lines to an Evershed gas holder height indicator. The apparatus which is fitted with telephone switches allowing speech communication over the same lines, has 'given every satisfaction.'

Evershed Electronic Gas Pressure Transmitter in Cambridge medium pressure system.

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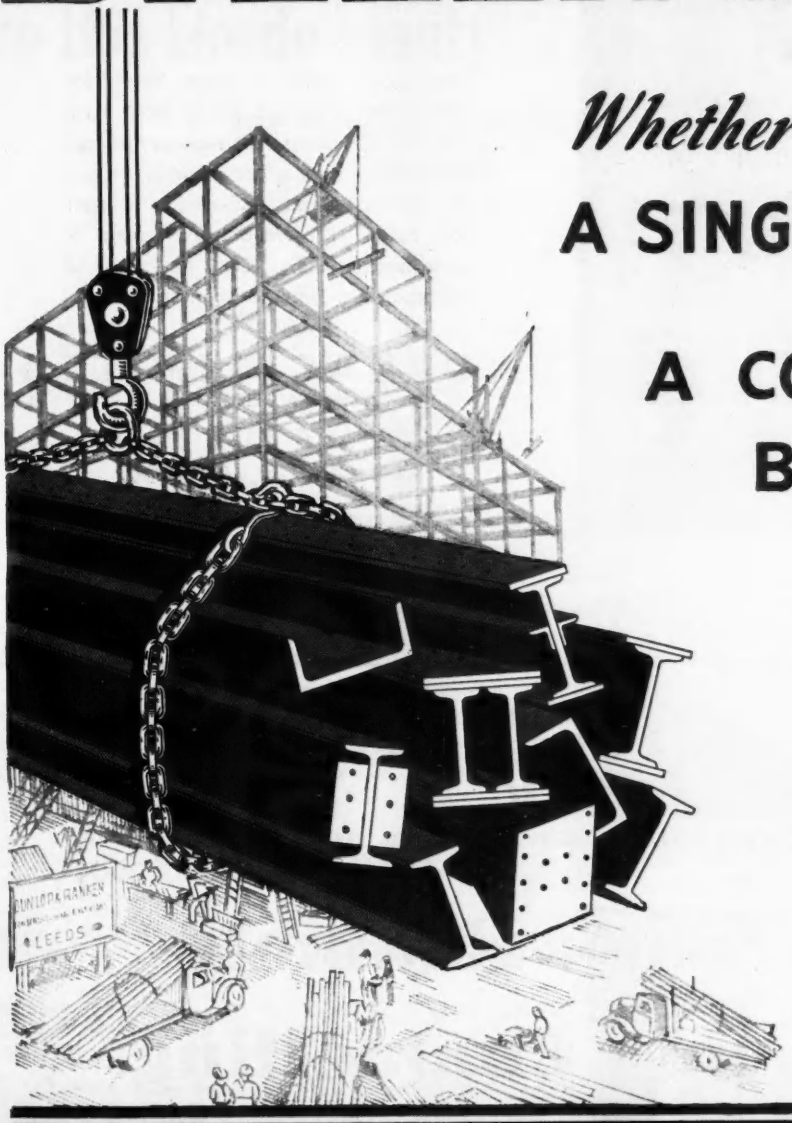

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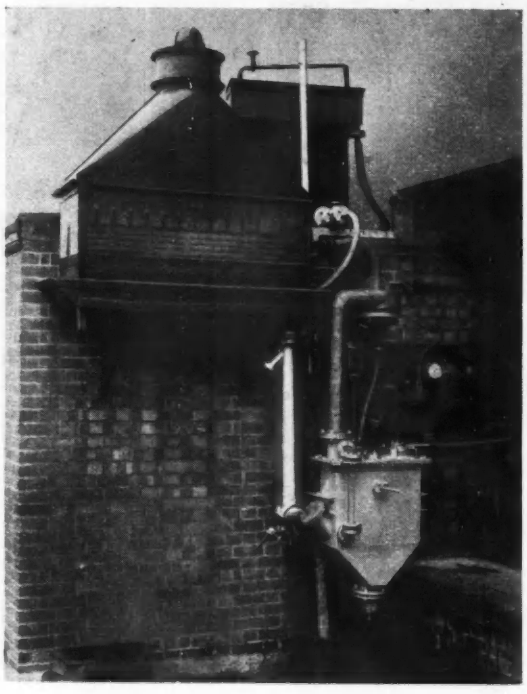

SPENT PICKLE RECOVERY PLANT

Illustration shows a Pilot Plant for evaporation of spent pickle from strip mills for the continuous recovery of free acid and monosulphate of iron by use of Swindin Patent Submerged Burner and Patent Pre-evaporator. Factor of performance 1·3. Can be seen in operation any time on application to :—

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With women in mind again...

We've added a FOLDING COVER-TOP to this blonde beauty...

THE GENERAL C 27-16 GAS COOKER

NOW a new important selling feature — a folding cover-top — is added to the General C 27-16. Thus, this most modern gas cooker with the light-toned hotplate is even handsomer and easier to keep clean than before. The General C 27-16 combines a whole range of other up-to-the-minute advantages that make it exactly to the heart's desire of housewives. Look at the list below and you'll realise why this beautiful cooker is proving so very *quick and easy to sell.* Order now.

Above you see the folding cover-top raised and firmly in position for cooking. Note that it is spacious enough for all needs and is fully equipped with plate rack.

Now — 7 reasons why this cooker tops the lists

1 Blonde or Black Top. Each cooker can be fitted with the familiar two-piece semi-solid black enamelled type of hotplate, or the new type hotplate in light-toned enamel like the rest of the cooker.

2 High Speed Boiling Burners easily removed for cleaning.

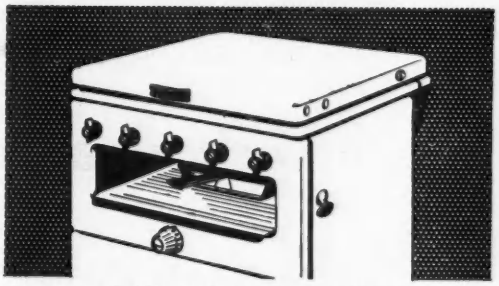
3 Faster Grilling. The wider heating area means quicker toasting and grilling.

4 Extra Oven Space. The 16″ oven is suitable for all but the largest families. Standard oven fittings provided are three reversible oven grids (two-position type), one meat tin and a cake tray.

5 Easy Cleaning. The simple design and vitreous-enamel finish make light work of cleaning. The hotplates can be wiped clean with a damp cloth.

6 Choice of Four Colours. The cooker is available in all cream, or all white, or green and cream, or grey mottled vitreous enamel.

7 Optional Folding Cover-Top as illustrated. Or the cooker can be had with the conventional fixed back plate, both types with dish rack.



The plate rack folds neatly into the top and here the cooker is shown closed, providing a trim, smooth surface.

DELIVERIES ARE NOW POSSIBLE

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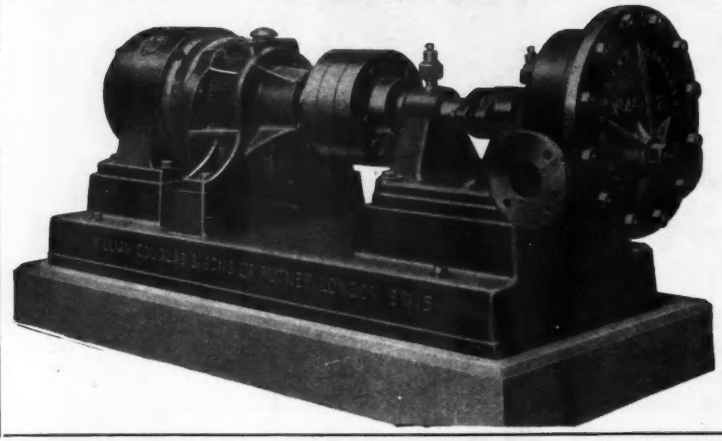

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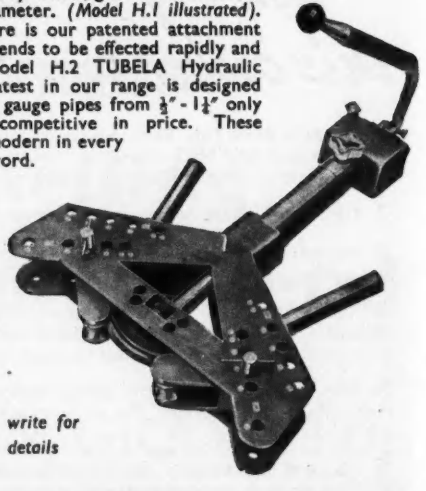
Following the success of our copper tube bending machines a range of Hydraulic Pipe Benders has been produced to deal w all classes of heavy water, gas or steam barrel from ½" - 3" diameter. *(Model H.1 illustrated).* A special feature is our patented attachment enabling 180° bends to be effected rapidly and with ease. Model H.2 TUBELA Hydraulic Bender, the latest in our range is designed to bend heavy gauge pipes from ½" - 1¼" only and is very competitive in price. These machines are modern in every sense of the word.



Model H.1
Hydraulic Bender

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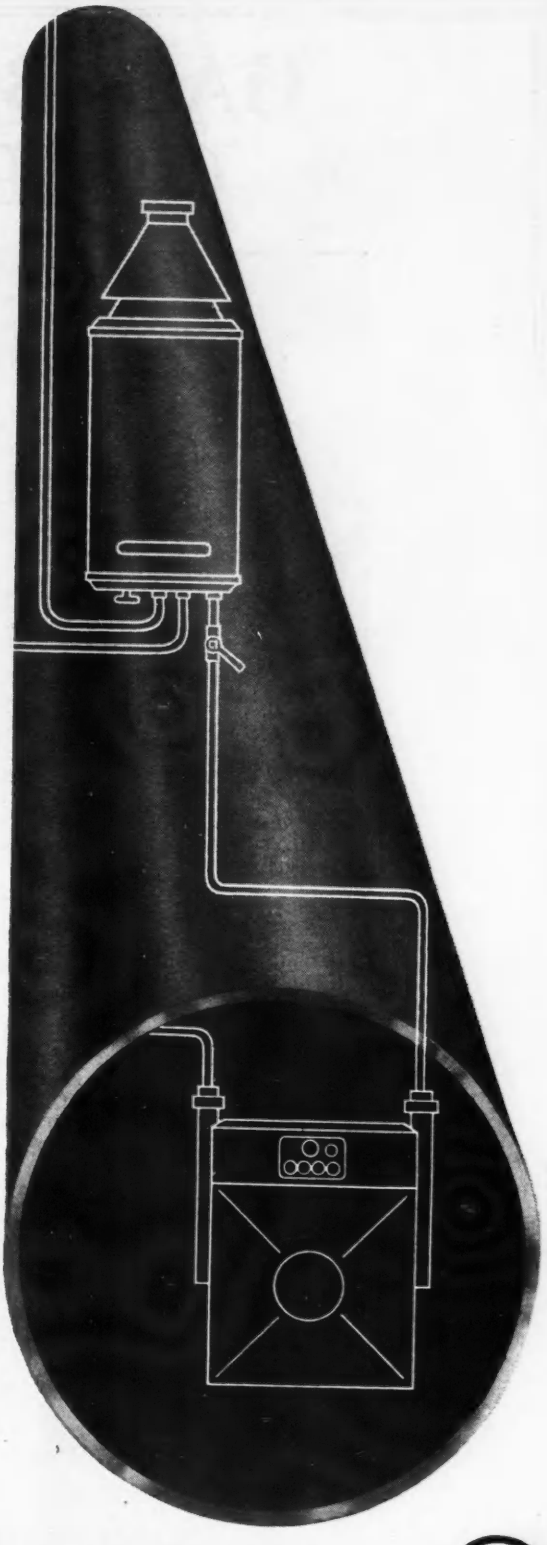
I.C.I. Copper tubes ensure trouble-free Gas Systems



For domestic gas systems, light gauge copper tubes made by the Metals Division of I.C.I. have five obvious advantages. They are :—

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3 **Easily manipulated and installed.**

4 **Strong in relation to their light weight.**

5 **Neat in appearance.**

Whatever the building—farmhouse or factory; house, hotel or hospital—the job is better done with I.C.I. copper tubes.

IMPERIAL CHEMICAL INDUSTRIES LTD LONDON SW1

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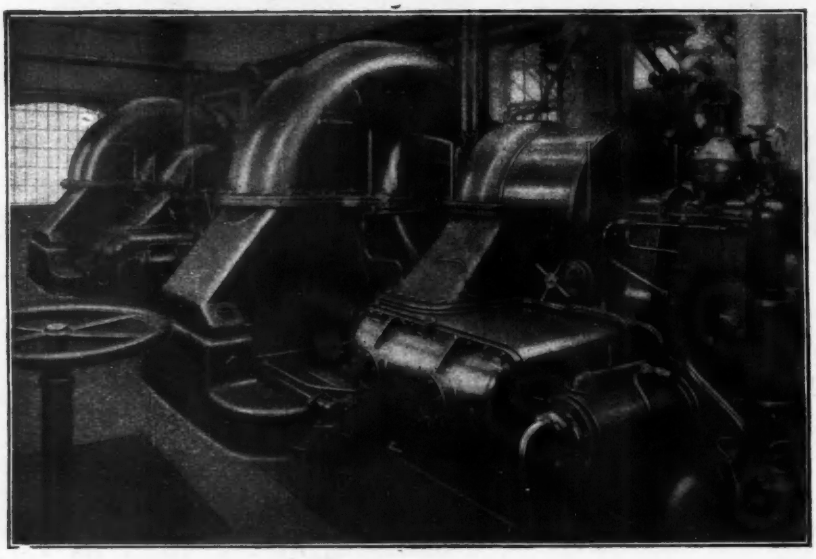
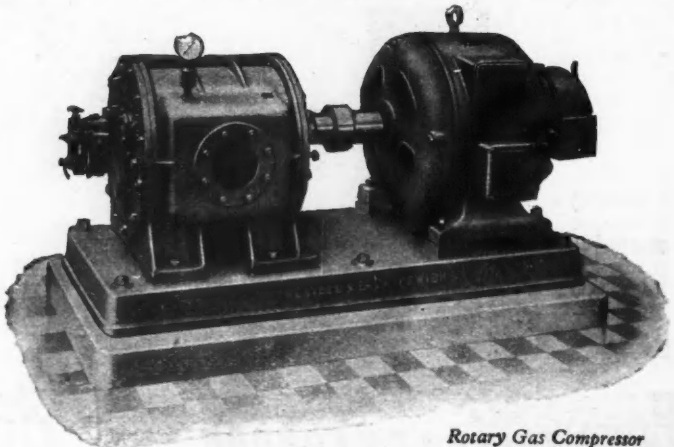
M.194

GAS BOOSTERS & COMPRESSORS



Illustrated above are two Turbo Boosters with capacities of 2,000,000 cubic feet of gas per hour each. They are direct-coupled to Steam Turbines.

We have supplied numbers of Steam Turbine and Motor Driven Exhausters for Coke Oven Plants; Steam Turbine, Motor and Gas Engine Driven Gas Boosters and Rotary Compressors for Transmission and Distribution Purposes; Portable Compressor Units for Breaking up Roadways with Pneumatic Picks for Laying Gas Mains, and for Caulking and testing Pipe Lines; and Turbo Blowers for Water Gas Plants. If you send us particulars of your requirements we will quote you for suitable plant.



Rotary Gas Compressor 120,000 cu.ft. per hour.

Write to Dept. "J" for illustrated pamphlets, giving full particulars of our manufactures.

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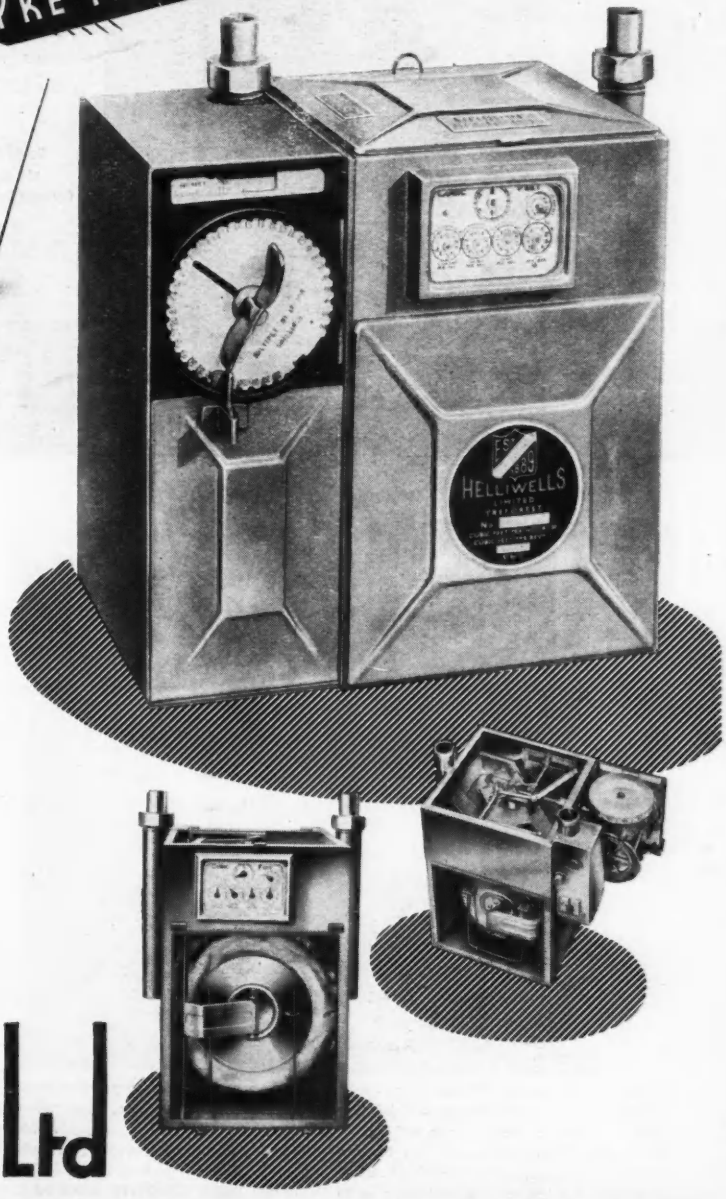

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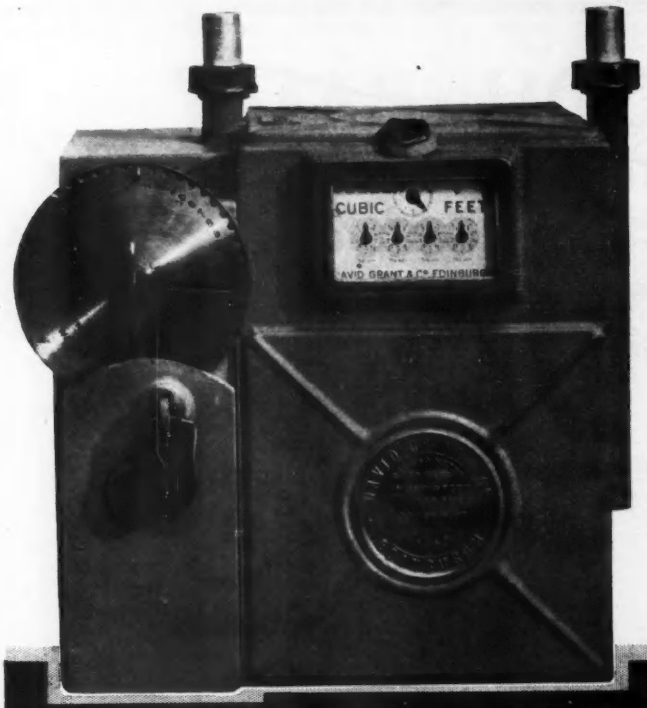

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100 cu. ft.
Optional Coin Meter

DAVID GRANT & CO. 1855 PIONEERS IN PREPAYMENT METERS 1950 EDINBURGH

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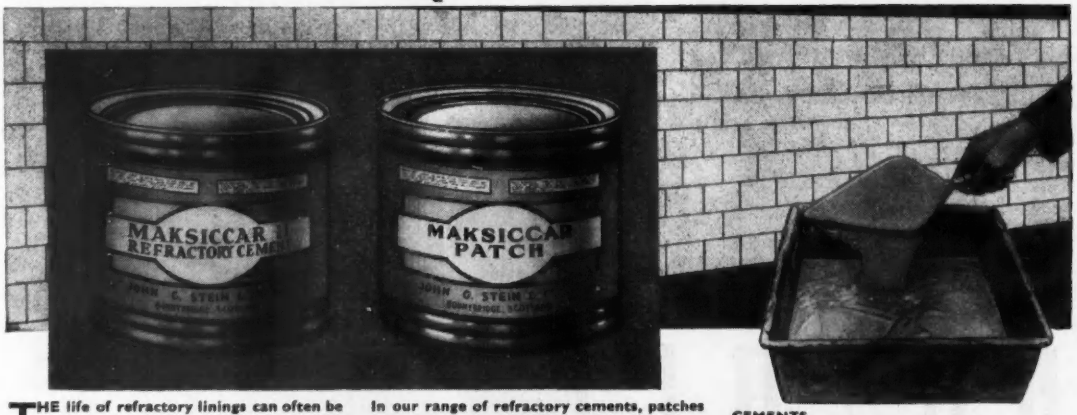

THE life of refractory linings can often be improved by the right choice of jointing cement. The best cement to use will depend on the specific conditions in the furnace concerned. Similarly in the use of refractory patches to repair damaged brickwork, or to replace special shapes in certain conditions, much better results will be obtained from the material with properly balanced properties.

In our range of refractory cements, patches and castable refractories, users will find a selection of high quality materials which can be relied on for a uniform high standard of quality. Full particulars are given in our **REFRACTORY CEMENTS AND PATCHES** pamphlet and we are always glad to give advice on the best application of our products.

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" Deserved the title with which I acclaimed them of ' Salamander.' Both thrived in the fire . . ." Naturally we of Bell's ardently reading Mr. Winston Churchill's latest volume, The Grand Alliance, published by Cassell's, were swift to appraise the tribute-name given to Generals Freyberg and Carton de Wiart. Salamander is the symbol under which we serve as students, as graduates, as specialists in Applied Asbestos. The rigours and urgencies of war on sea and land and in the air put Asbestos to the proof as never before; it " thrived in the fire " by way of answer. And now in new and exacting demands, less dramatic but no less imperative; in the call for full and efficient productivity with husbandry of heat and power; in the solution of countless industrial problems; in developments in Australia and New Zealand and Africa, for example, the Salamander is still a very significant symbol. Engineers in quest and zest for excellence in every part of the machinery and power under their supervision constantly consult Bell's and we are proud of their confidence

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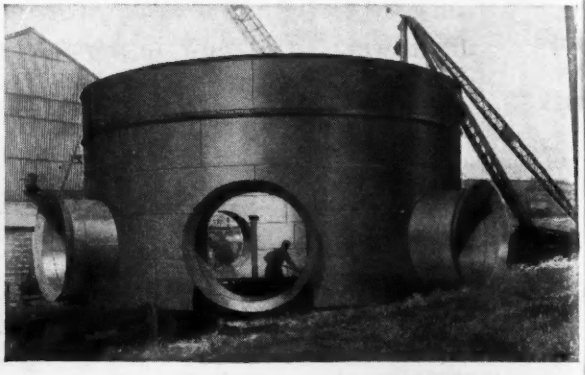

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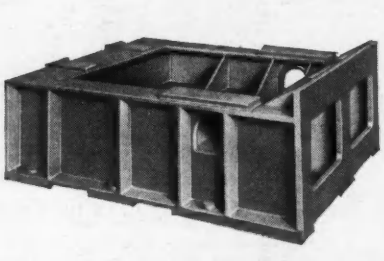

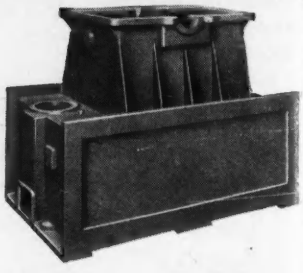

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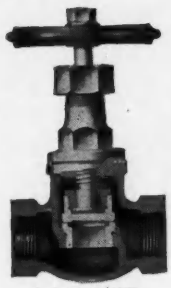

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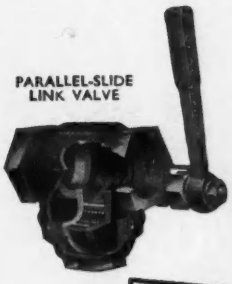

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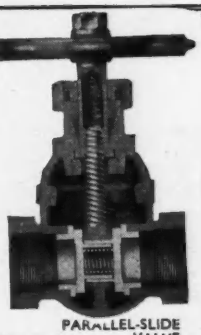

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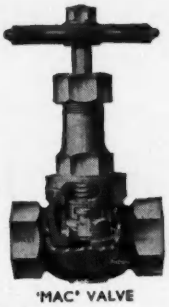

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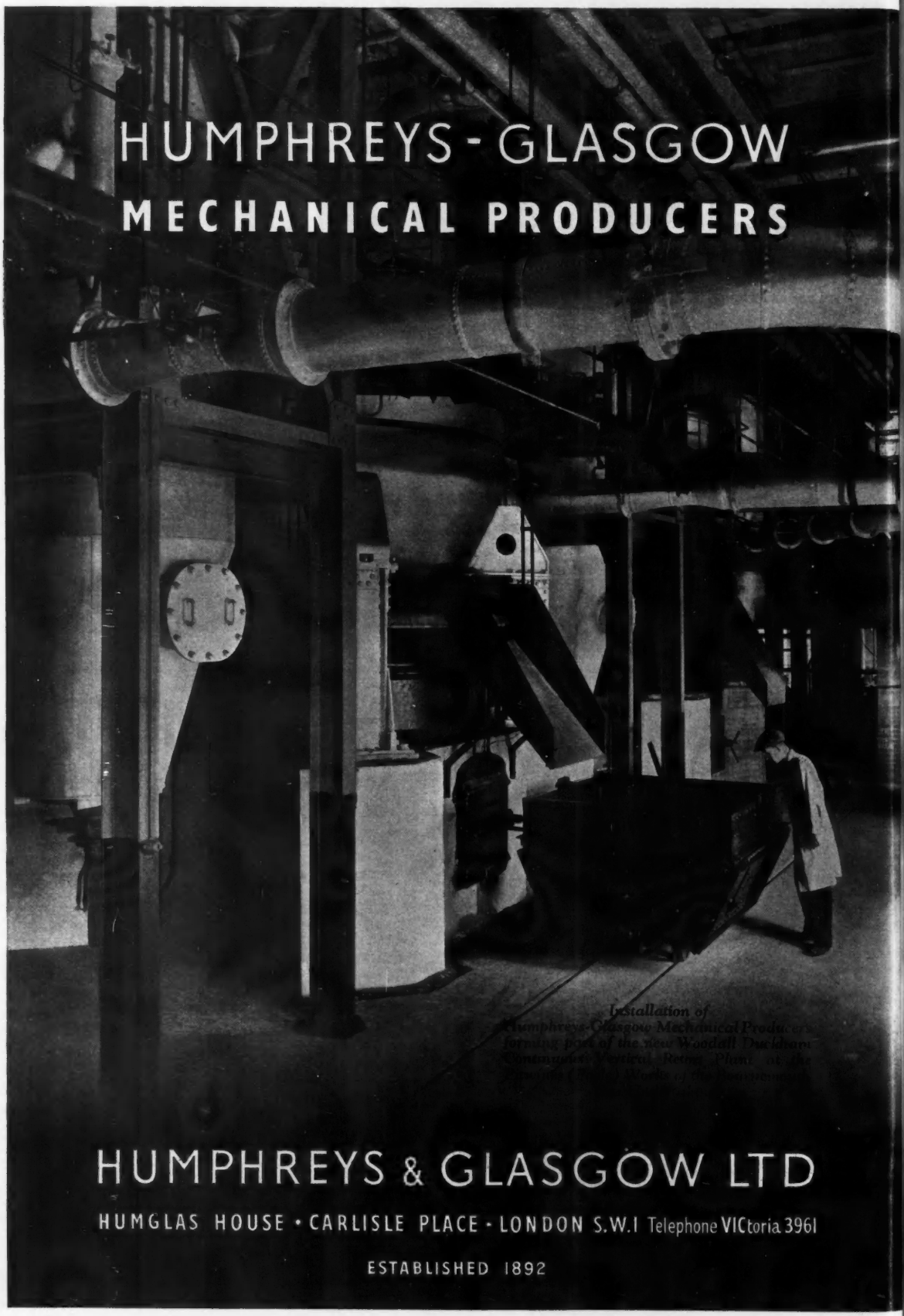
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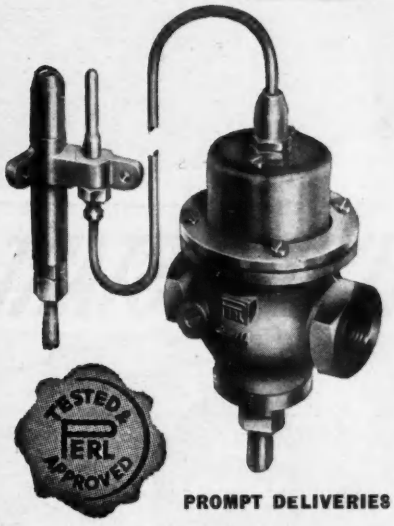

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Gas Journal

102nd YEAR OF PUBLICATION

EDITOR: NORMAN S. SMITH, B.Sc.(Gas Eng.)

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VOL. 263 *NO. 4550* *AUGUST 16, 1950*

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The dispute between the London Society of Compositors and the London Master Printers' Association continues, and no overtime is being worked. As a result, there has been no alternative but to reduce temporarily the number of pages of the Gas Journal. *Within the enforced smaller compass we are doing all possible to maintain the* Journal *news and technical service, though abbreviation is inevitable till the dispute is settled. In the difficult circumstances we ask subscribers' indulgence.*

Publishers' Notice : See page S3.

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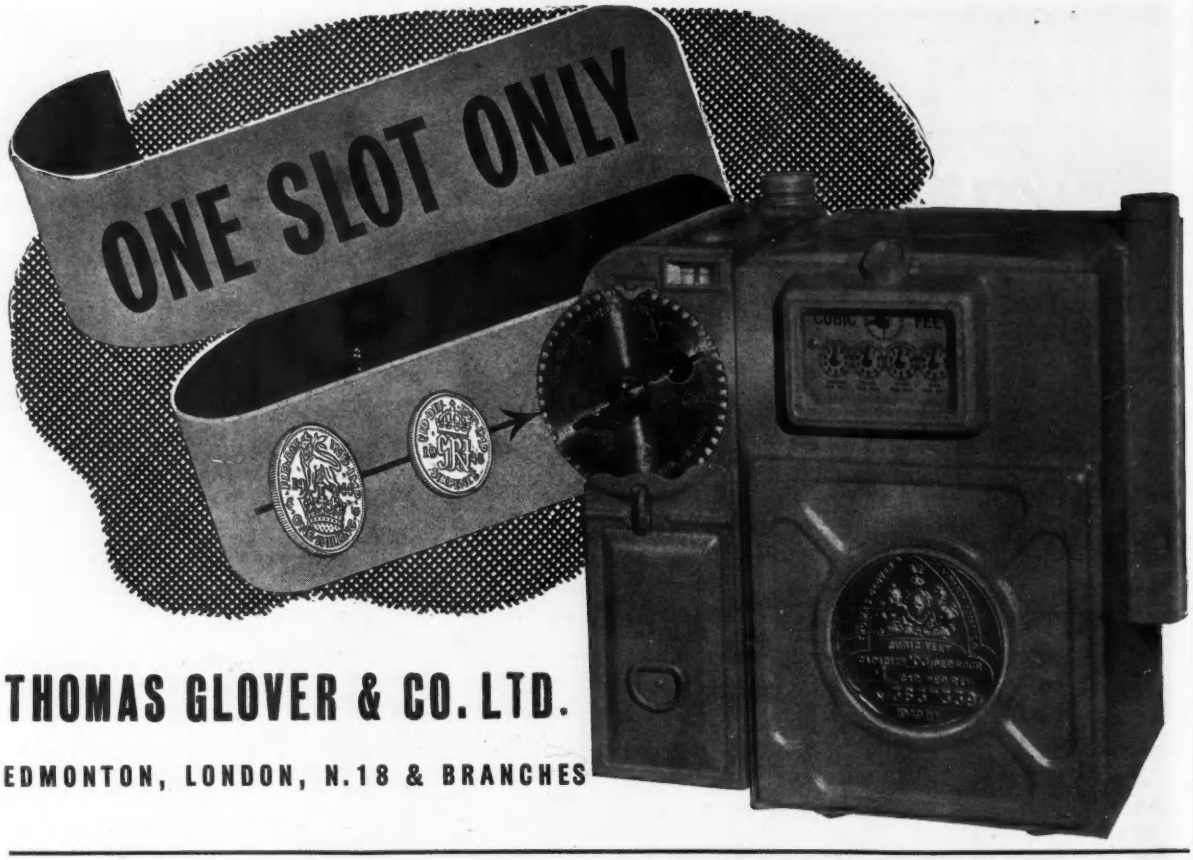

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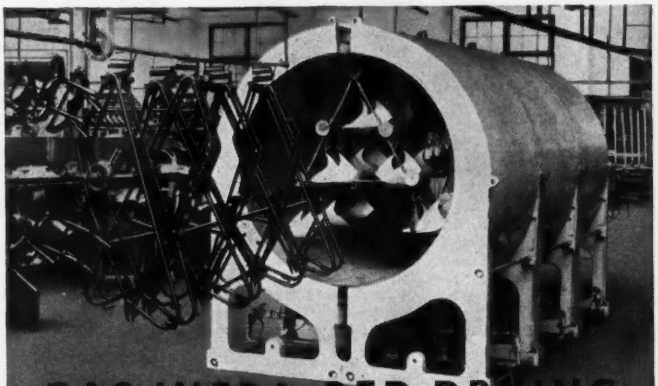

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GAS JOURNAL

VOL. 263. NO. 4550 102ND YEAR AUGUST 16, 1950

SURVIVAL

FOR his address as President of the Institute of Fuel, Dr. D. T. A. Townend, for whom we have friendship and regard, took as his theme 'Education and Survival.' A wide topic? How deep did Dr. Townend penetrate this obviously interesting problem?

The remarks of Dr. Townend, which we are glad to publish in this issue of the *Gas Journal*, call for the thought which they conspicuously merit. Our first reaction is that his address was most tactful, bolstering our 'evolutionatory' elements in education. With this 'evolutionary' element we thoroughly agree. But, he says, today (*sic*) we are faced with a problem of survival, and with the realisation that this must depend almost entirely upon our achievements in science and technology. It is on this aspect that we disagree (on a percentage basis) with Dr. Townend. Speed in technology has always attracted mankind and has brought womankind in its wake. The speed of the sail at sea not so long ago, the speed of the turbine-generated propellor of the ocean going ships more recently, the speed of the jet-propelled aeroplane of today—all these speeds will doubtless be surpassed tomorrow as a result of work by technicians of the parlour or the drawing room.

To what degree will this speed element, this evolutionary advance in science, *per se*, help survival? Is it a fact that the universities of our country today, old universities and new universities alike, are hidebound? Is it true that their recruits have impressed upon their minds by their tutors that technical education should be based on a study of some foreign language or another? That technical education cannot hope to achieve the survival which is its aim if its interpretation is confined to a single language? We set out these questions for others to answer; but it does seem to us that technical education in this country is lacking in the standards of general education which it should not only ask but demand of those who are going to show the way to a new Pluto. Of course, there are difficulties. We were told the other day by an ex-Oxford man, an ex Burma-man, a schoolteacher, that on taking his early-morning class in history (a class of over 30) in a State school in East London, three policemen were present to take away three boys for better education in a more approved school. That is hardly a good start for technical or even more general educational enlightenment, but the example happens to serve our purpose in this brief comment on Dr. Townend's address. Education, it would appear, is either dull or exciting to the young. Without bad education, there would be no judges. The merits of a civilisation depend upon its tolerance, and so on. We think that Dr. Townend's scientific training and his professional experience may have tended to lay too much emphasis in his address on coal, the indigenous material to which we have by some been instructed from our youth, we owe our very existence in this country. What about oil? The shipping of coal was a prominent source of prosperity to Great Britain for many decades. The shipping of oil is paramount to our survival. Dr. Townend, we suggest, placed too much emphasis on coal and too little on oil when he talked about education and survival, which will depend on the physical and mental endurance of any particular nation or any set of nations.

EDUCATION AND RECRUITMENT

OF the many problems created for the gas industry by the second World War, none was keener than that of manpower and the subsequent return of employees out of touch, and sometimes out of temperament, with their former work. The task of receiving the homecomers into the fold and continuing their interrupted training was a gigantic one, but one that has been successfully accomplished. The war had another effect on manpower, too, and one less easy to overcome. Easy money for boys below conscription age during and immediately after the period of hostilities made recruitment for the industry a matter for considerable anxiety. But here again careful revision of pay rates and vigorous publicity, in conjunction with co-operative and friendly assistance from educational bodies, have done much to guarantee an adequate supply of talented manpower in the future. The problem still exists, as many know only too well, but in some areas it is well under control.

In these days, with the emphasis on electricity, and the glamour which in the young mind is associated with atomic energy, the idea of becoming a gasfitter is not best calculated

to appeal to the ambitious youngster. His parents, too, although perhaps less obsessed by essentially modern developments, have more elaborate plans for their offspring. For years now the term 'gasf tter' has been criticised in the gas industry but a sensible substitute has yet to be found. Perhaps the solution lies in better contact between the schoolboy and the gas industry, laying emphasis not only on the safe and remunerative character of gas fitting, but also on its importance to the community and the possibilities for promotion. Again, in some areas this aspect of the matter is stressed, but in general we believe that much more could be done to interest the boy in the job and make him feel that it has even a certain dignity. To achieve this a new, enlightened outlook on the part of the undertaking is required, an appreciation of changing methods and values.

This new outlook has many ramifications. It applies no less to the manner in which youth is trained, for educational methods have not remained static during the past 20 years, and training for the gas industry must follow the same teaching pattern as was experienced during a boy's school life. The point is made and elaborated in a recent paper to the Midlands District Salesmen's Circle by Mr. W. J. Parsons. As Fittings Superintendent at Birmingham the author's connection with teaching is an intimate one and has provided him with food for thought. His paper pivots on two things: The changes which have been brought about in the system of education by the 1944 Education Act, and the fundamental differences between the present day teaching technique and that by which the older generation was taught 20 or more years ago. The difference in teaching might be expressed this way—that whereas a child attended school to receive instruction in certain basic subjects, the purpose of his education today is to develop him as an individual. The Act also decrees that all children shall have a secondary education.

Mr. Parsons explains how this present-day education is compounded, how the three phases of infant, junior, and secondary school are related, how the child's intelligence and ability are graded, and how his progress depends on these assessments. He contrasts classroom technique in the past with that employed today, resulting in the dividing of children into small groups within the class, freedom of movement, use of film and radio, and gayer classrooms. Wisely he does not attempt to draw a comparison between the results of the old and new methods; instead he emphasises that, for better or worse, the change has taken place and must be recognised. 'At one time,' he states, 'I thought that the younger generation are not what they were in our day. Now I am inclined to the view that the reason for their apparent apathy lies in the fact that we, as teachers, are rather out of tune with the student.' This is a brave statement and provides a pleasant change to the oft-heard condemnation of modern youth. As Mr. Parsons points out, most teachers in the gas industry are not teachers by profession; they are usually technicians who are sufficiently enthusiastic about their jobs to want to pass on their knowledge and experience to their successors. Moreover, their conception of teaching is based on the way in which they themselves were taught—by the oral method. The application of this method to youngsters who have been accustomed to seeing and doing for themselves, not being 'talked at,' results, not surprisingly, in the stifling of any initial interest they may have had.

TOMORROW'S TEACHERS

MR. PARSONS would have done only half the job if he had left the matter there. Fortunately he is confident in the possession of the solution, and he sets out abundant evidence to support his contentions. To our mind, however, he has already accomplished the vital part of the cure, by the realisation that all is not well with the industry's teaching mechanism. What chance of improvement can there be when the need for improvement is not recognised? Here, briefly, is the author's recipe for improved teaching. Firstly, he commends the short course for teachers of gas engineering and gasfitting which is held each year under the auspices of the Ministry of Education, the Institution of Gas Engineers, and the City and Guilds of London Institute. Failing that he advises a close examination of the City and Guilds syllabus for gasfitting and the exercise of a little ingenuity on the part of the teacher to avoid the abstract descriptions and mechanical phrases in favour of the practical demonstration and the participation of the student. He recommends an examination of available film strips and the use of the projector and the epidiascope whenever applicable. Above all, the aim of the teacher must be the generation of interest and the continuation of teaching methods familiar to the student.

We referred earlier to recruitment. Mr. Parsons makes particular reference to this subject, describing some of the methods of approaching schoolchildren for which Birmingham is rightly famous. That these efforts have borne fruit is amply proved by the fact that during the last two years sufficient applications have been received to enable the undertaking to make a careful selection; the number of boys engaged as gasfitters' assistants alone is 47.

The Birmingham undertaking sends all boys in the Fittings Department between the ages of 15 and 17 to a day continuation school for one whole day per week. Of this the author has certain doubts and considers the possibility of the undertaking preparing its own syllabus and perhaps engaging its own professional teacher. There is, he feels, another weakness due to the lack of some teaching in elementary workshop science, for teachers in the theory of gasfitting are handicapped by having to spend too much time in explaining the simplest phenomena before proceeding with the main subject. Other plans include a possible revision of workshop training to enable a large portion of the theoretical syllabus to be taught with a more practical slant, and the inclusion of a new class called 'Appliance Demonstration' to enable the student to see and handle all types of appliance, sectional models, take gas consumptions and diagnose appliance and installation defects.

These are but a few of the points covered in this unusually searching paper, which will be published in full in the September issue of *Gas Service*. The industry's attention is —or should be—closely centred on training and education, and such provocative contributions to the subject are welcome. 'Teaching,' concludes the author, 'can be the most disappointing occupation, but the rare occasions on which it can be most satisfying make up for all the disappointments.' True enough, but with the right approach and a new conception of teaching, perhaps the disappointments will be fewer and the satisfaction more complete.

PUBLIC MEETINGS

THE meeting of the chairmen of the 12 gas consultative councils with the Minister of Fuel and Power a few weeks ago is reported to have been so useful that further meetings at quarterly intervals are contemplated. The Minister is obviously anxious that the public should know more about the existence and the functions of the consultative councils; indeed publicity and public relations were among the main topics of conversation at the meeting to which we have referred; and one outcome of the report on the meeting which Councillor Bayliss presented to the July meeting of the North Thames Gas Consultative Council was an announcement that meetings of the council—but not of the district committees—will in future be open to members of the public in the area, as well as to representatives of the Press. Some councils have received requests from organisations for copies of minutes and reports but it has been felt that such documents, especially if not accompanied by relevant records of decisions reached, might be misunderstood.

To invite individual consumers within the area, whether they represent organisations or not, to attend meetings in person is, we think, the right step, but from nearly a year's experience we doubt very much whether there will be anything in the nature of queues for the public seats. Only a very small proportion of the newspapers circulating in the various areas report the meetings; how to keep them informed of matters which are both of official importance and of 'news value' from the point of view of the sub-editor is still an unsolved problem. On more than one occasion we have commented on the fact that while the 11 consultative councils in England and Wales were welcoming the Press to their meetings the Scottish Gas Consultative Council persisted in meeting in private. On August 9 Councillor A. T. Morrison, Chairman, held a Press conference immediately following a meeting of the council and announced that in future the Press would be welcomed to ordinary meetings. He marked the occasion by releasing a statement on the Scottish Gas Board's development plans involving an expenditure over the next few years of more than £1 mill.

Publicity, however, is not an unmixed blessing, as evidenced by one of the complaints reported by a district committee at the North Thames meeting. It was stated that Kilburn consumers who wished to discuss delicate financial problems with the board's officials in the showroom had to do so in the presence of neighbours. The district committee urged that consumers desiring privacy in discussing their affairs should be suitably accommodated. The council upheld the complaint and added a suggestion that the more sensitive consumers should be informed that representatives were prepared to call on them in their own homes. Not all the complaints which reach the councils, either direct or through the district committees, are so well grounded, and as they gain more experience the councils are proving themselves no less useful in presenting the boards' point of view to the consumers than in presenting the consumers' case to the boards. The more they develop this 'two-way traffic' the more effective they will be in helping the industry to create and maintain an improved public service.

Letter to the Editor

THE PRODUCER

DEAR SIR,—Commenting on the excellencies of Mr. W. S. Hubbard's Institution paper, and the discussion arising, your editorial of July 5 summed up by saying, in effect: 'The mechanical producer, having come to stay will it be in the form of elaborate plant, or will there be some simpler solution of the problem?'

It being 'better to travel hopefully than to arrive,' I hope early development will be in the direction of the downward gasification of coke, whereby much of the harmful dust may be fluxed to an easily removable solid from beneath the fire, and the remaining dust efficiently extracted by some combination of cyclone electrical precipitation; and gasifying the breeze and the coke which has become degraded in the gasworks coke-grading plant.

As however, history may repeat itself, by giving us something more simple, let us take a long backward glance. During the 1914-18 war, when women came into the retort-houses—necessity being the mother of invention—bar-grates found favour over the step-grates of the period, as being less arduous for the women to clean. Yet, with the return of men, the step-grate gradually again found favour. Hence it seemed to me that, by and large, the bar-grate is *easier* to work, while the step-grate is harder to work, but takes *less* time. As the outcome of varied experience and different coals, a composite-grate formed by combining the merits of both types seemed advantageous and was designed, but never materialised. Each step was pivoted, and had transverse (rake-like) prongs.

Between the periods for cleaning the fire, the steps were inclined to form a smooth bar-grate, down which the incandescent fuel could creep to maintain the constant high rate of gasification, per unit of effort. During the cleaning of the fire the steps were pivoted to the horizontal position and the cleaning proceeded, just as at present. Considering the very heavy capital cost of mechanical producers it may well be that this idea of a composite-grate could take root and develop and cause history to repeat itself, by offering *ad-lib* in one grate, the two different grates, the better to meet the two different periods.

Yours faithfully,
H. J. TOOGOOD.

'Stoke-Pero,' 43, Uxbridge Road,
Hampton-on-Thames, Middlesex.
July 29, 1950.

Diary

Aug. 28.—West Midlands Gas Consultative Council: Gas Offices, Edmund Street, Birmingham, 2.30 p.m.

Sept. 5.—East Midlands Gas Consultative Council, Guildhall, Nottingham, 2.30 p.m.

Sept. 5-7.—Irish Gas Association: Annual Meeting, Limerick.

Sept. 8.—Northern Junior Gas Association: 'Distribution,' G. Haddon (Stockton), at Stockton.

Sept. 11.—Women's Gas Council: Executive Committee, at Gas Industry House, S.W.1, 1 p.m.

Sept. 18-22.—Association of Public Lighting Engineers: Annual Meeting and Conference, Bournemouth.

Sept. 20.—Southern Gas Consultative Council: Reading, 2.30 p.m.

Sept. 21.—North British Association of Gas Managers: Annual General Meeting, Oban. 'Group Working,' N. C. Sturrock (York-Harrogate Group, North Eastern Gas Board; 'The Use of Town Gas in a Dental Workshop, with special reference to heat treatment of Acrylic Resin,' W. Kirk (Motherwell and Wishaw); 'Sales and Development,' Part 1, R. Cowie (Hawick); Part 2, T. Gordon Bennett (Edinburgh and South East Division). (Golf and bowling competitions on Sept. 20; steamer excursion on Sept. 22).

Sept. 22.—Northern Junior Gas Association: Visit to West's Gas Improvement Co., Ltd.

Sept. 28.—North Thames Gas Consultative Council: St. Ermin's Hotel, Westminster, S.W.1, 2.30 p.m.

Oct. 11.—Society of British Gas Industries Golfing Circle: Autumn and Annual General Meetings, Richmond Golf Club, Sudbrook Park.

Personal

Mr. **K. E. Muir** is leaving the Bridgend undertaking to take up a post with the Wellington Tube Co., Ltd., and will not therefore be taking the Presidency of the Wales and Monmouthshire Junior Gas Association for the 1950-51 session. The vacancy thus created will be filled by the Junior Vice-President, Mr. **C. L. Singleton,** Manager of the Chepstow and Caldicot undertaking.

◆ ◆ ◆

Mr. **Stephen Hay**, G.M., A.F.C., F.INST.F., has retired after 41 years' service with the North Thames Gas Board (formerly the Gas Light and Coke Company). Born at Peterhead, Aberdeenshire, he was educated in Scotland and joined the Gas Light and Coke Company in 1910 as an engineer staff pupil. After a period as junior Assistant Engineer at Kensal Green he became junior Assistant to the Engineer at Beckton in 1913. He joined the Royal Flying Corps in 1916 and served with distinction in the first world war, being awarded the A.F.C. He returned to Beckton in 1919, and was promoted to the position of Senior Assistant Engineer there in 1926. Two years later he was appointed Assistant Resident Engineer, and in 1930 he became Deputy Station Engineer, which post he held until early in 1941 when, on the retirement of Mr. H. Moys, he was appointed Station Engineer at Beckton. Early in 1946 the Gas Light and Coke Company announced important changes in the Chief Engineer's Department, involving the appointment of four Group Engineers. Mr. Hay became one of the four, taking charge of Group 3 (Fulham, Nine Elms, and Kensal Green, and later Southend), and after nationalisation he carried added responsibilities with the extension of the Group to include Brentford, Southall, Mill Hill, and Hornsey. He is to spend his—we hope many happy—years of retirement in Scotland.

Mr. **G. E. Spears** has been appointed Assistant Manager of the coke oven department of the Workington Iron and Steel Co., Ltd. Mr. **R. Briggs** has been appointed Assistant Manager of the Lowca tar distillation plant.

◆ ◆ ◆

Mr. **J. Morley,** Chairman and Managing Director of Meters, Ltd., has relinquished the position of Managing Director but will remain Chairman; Mr. **G. Barlow** has been appointed Managing Director and Mr. **P. P. MacDiarmid,** Sales Director, has been appointed Deputy Chairman.

◆ ◆ ◆

Mr. **J. W. Kaye,** Group Engineer of Group IV of the North Thames Gas Board, was erroneously referred to last week as Group Engineer of the South Western Division. Mr. C. Pearson and Mr. P. G. Wright, Joint Divisional Managers, photographed in company with Mr. Kaye, are not under Mr. Kaye; the commercial side functions directly under the board's Commercial Manager, Mr. S. G. Aberdein.

Obituary

Mr. **Edward James King,** a Director of Robert Dempster and Sons, Ltd., died last week at the home of his son, Mr. E. W. King, at Elland, after an illness of five months. A native of Frome, Somerset, Mr. King, who was 79, joined the Company in 1893 as a draughtsman, and during 41 years' active association with the Company he became chief draughtsman, outside representative for 20 years, and Joint Managing Director from 1927 to 1934. He retired from the Joint Managing Directorship in 1934, but retained his seat on the Board until his death. He had been a Director for 48 years. Outside his business activities, Mr. King interested himself in civic affairs and was a member of the local council from 1935 until 1944.

News in Brief

The Alliance and Dublin Consumers' Gas Company has declared an interim dividend in respect of the half-year ended June 30, on Consolidated Ordinary stock, of 3% actual, less tax, the same as last year.

Instrument Manufacturers.—At the Council meeting following the 33rd annual meeting of the Scientific Instrument Manufacturers' Association, on July 13, the following officers for 1950-51 were elected: President: M. H. Taylor; Vice-Presidents: J. E. C. Bailey, C.B.E., and A. W. Smith; Treasurer: S. Borthwick; Secretary: J. Rock Cooper.

The Northern Gas Board has informed Stockton Town Council that the supply of gas to the council's housing estate would continue on the same terms as before nationalisation until the estate was completed. The board pointed out, however, that its present policy was to recover from the owner or occupier of the property a contribution towards the cost of the service pipes laid in private property.

Prefers Gas to Farming.—For the second year in succession, Gordon Henry, 19-year-old technical assistant at Peterborough gasworks, won the Martin Cup at Peterborough Agricultural Show for the junior judging competition, obtaining 98 marks out of a possible 120 for judging four Ayrshire heifers. He has been a member of Peterborough Young Farmers' Club, of which he is now secretary, for three years, but says he does not feel that he wants to be a farmer.

Water Gas Plant.—Commenced nearly two years ago, the new carburetted water gas plant for Loughborough gasworks has now been brought into operation by the East Midlands Gas Board and has a daily maximum production capacity of 750,000 cu.ft. The plant has been designed on modern lines and has automatic control.

Gas Bracket as Coat Hanger.—At a Bradford inquest on John William Rowntree, aged 66, who was found dead in bed from gas poisoning, the Coroner, Mr. R. S. Bishop, drew attention to the danger to people using disused gas brackets as coat-hangers. It was stated that on retiring to bed Rowntree had hung his clothes on a disused gas bracket. Fred Metcalfe, an inspector for the North Eastern Gas Board, said he was satisfied that the clothing had caused a fracture in the pipe. A verdict of 'death from misadventure' was recorded.

The British Oxygen Co., Ltd., has launched its Scottish training centre for all in the welding and cutting industries at Hillington, Glasgow. Opened on August 7 the school will take groups of workers by arrangement with their firms and train them to an agreed standard in any particular process in which the user is interested. Courses will last from two to ten weeks according to the nature of the training and will be organised to suit firms rather than run as routine classes. The range of work covers all oxy-acetylene welding, oxygen cutting by hand or machine, argon arc welding, and ancillary processes.

Trade Statistics.—Figures for June, 1950, issued by the Central Statistics Office in the Republic of Ireland, show imports of 30,776 tons of gas coal, valued at £140,190, as against 20,549 tons, valued at £89,149 in June, 1949. This brings the total of these imports for the first six months of 1950 to 120,278 tons, valued at £560,305, compared with 108,169 tons, valued at £487,815 in the corresponding period of 1949.

'Children's Day' organised by the Leeds Education Department was held in Roundhay Park, and was attended by some 80,000 spectators. The Leeds District of the North Eastern Gas Board entered a decorated lorry in the trades section of the procession, and was awarded 2nd prize. The procession passed along a crowded route of approximately five miles, from the City Centre terminating at the Sports Arena, Roundhay Park.

Bakers Want Cheaper Gas.—Three thousand master bakers in the North West of England are to make a demand to the North Western Gas Board for cheaper gas. A four-man deputation from their area federation is to meet officials of the board as soon as possible to ask for standardisation of rates and more favourable terms for the trade. Bakers complain that different undertakings in the north-west charge bakers different rates for gas. The deputation, headed by Mr. S. B. Redfern, of Hyde, President of the Manchester Master Bakers' Association, is expected to ask the board to cut its price to the lowest rate now being charged in the area.

St. Albans Gasworks Extensions Opposed

Ministries' Joint Public Enquiry

MR. A. G. SHOOSMITH, F.R.I.B.A., O.B.E., sitting as Inspector for the Ministry of Town and Country Planning, with Mr. J. S. Smith, O.B.E., and Dr. F. H. Moore, for the Ministry of Fuel and Power, held a public enquiry at the St. Albans Town Hall on August 9-12 into the application of the Eastern Gas Board for approval of proposed extensions at the St. Albans gasworks. The enquiry was the first of its kind since nationalisation and aroused considerable local interest because the board's proposals were opposed by the St. Albans City Council and by a large number of residents in the vicinity of the works.

Mr. A. Capewell, K.C., and Mr. E. Blain, instructed by Dyson Bell and Company, and Mr. D. N. Cox, Solicitor to the board, appeared for the Eastern Gas Board. The application was opposed on behalf of the St. Albans Council by Mr. H. Willis, instructed by the Town Clerk; and on behalf of the St. Albans Gasworks Petition Committee (representing local residents) by Mr. Beecher Bryant, Solicitor. Mr. F. R. Boyce, Deputy Clerk, represented the Hertfordshire County Council, the planning authority for the area. Mr. A. Bellingham watched the proceedings on behalf of the Hemel Hempstead Development Corporation; Mr. C. W. G. T. Kirk, Town Clerk, on behalf of the Hemel Hempstead Town Council; Mr. F. Palmer, Chairman, on behalf of the St. Albans Waterworks Company; and Mr. C. Brown, Chairman, on behalf of the Colne Valley Sewerage Board. There was a large attendance of the public, among whom sat Mr. R. Turner, Mayor of Bedford and Chairman of the Eastern Gas Consultative Council.

A Matter of Urgency

Mr. Capewell said the enquiry was being held under a direction given by the Minister of Town and Country Planning under Section 13 of the Town and Country Planning Act, 1947, dealing with two purifier towers and a gasholder of 2 mill. cu.ft. capacity. Questions would, however, be raised relating to extensions and additions to the works and no attempt would be made on behalf of the board to restrict the proceedings to the items mentioned in the direction.

The position with regard to gas supply in the Watford Division, and particularly in Groups 1 and 2 of the division had become serious and the board wished to know—and to know as soon as possible—what was the view of the two Ministers as to the future use of the St. Albans gasworks site. If no extensions were to take place there immediate steps would have to be taken to work out other plans to deal with the rather grave position which had come about owing to the substantial increase in demand which had already taken place, and the further increases which were bound to arise.

Historical

Gas was first made on two acres of the present site in 1835 and manufacture had continued ever since. The original company was incorporated in 1856 and re-incorporated in 1870, when the waterworks undertaking was separated. Three more acres of land was bought in 1879 and scheduled for gas-making in a later Act of 1899. The Watford and St. Albans companies became amalgamated in 1929, by which time the St. Albans company owned between nine and ten acres of land scheduled for gas-making. In 1936 another ten acres were bought and scheduled for gas-making; and in 1949 a further eight acres were acquired on which it was hoped eventually to build houses for key personnel. The present total area of scheduled land was approximately 27 acres.

Before Nationalisation

At vesting date the Watford and St. Albans undertaking comprised Watford, St. Albans, Hemel Hempstead, Elstree and Borehamwood, Welwyn and Hatfield, and Rickmansworth; and in addition gas was being sold in bulk to Chesham. Gas was being made at Watford, St. Albans, and Hemel Hempstead, and the other works were being used for storage and distribution. The question of extensions at St. Albans was raised more than two years before nationalisation, when a request was made to be allowed to build houses for key personnel. A letter addressed to the Town Clerk in February, 1947, drew attention to the fact that since 1939 there had been a 65% increase in the consumption of gas and the position was becoming serious; as soon as labour and materials were available work would have to be put in hand to extend the works to meet the increased demand, and it was necessary to house certain key workers. The company therefore asked for licences to build the houses. In August, 1947, a plan of the proposed development was sent in, and matters continued to be discussed both orally and by correspondence until February of this year when formal application for consent was made.

Change of Attitude

On April 11 of this year the Town Clerk wrote a letter saying that the committee of the St. Albans Town Council which had been considering the matter was disposed to view it favourably, but on April 27 a further letter from the Town Clerk was received saying that the Council as a whole had decided to refuse the application, and was not prepared to accept the recommendation of the committee.

On the question of the need for additional output, Mr. Capewell said there were three groups within the Watford Division. Group 1 was, with certain slight modifications, the area of supply of the old Watford and St. Albans company; Group 2 consisted of Luton, Markyate, Dunstable, Woburn, and Woburn Sands; and Group 3 comprised Hitchin, Letchworth, and Baldock. The board's primary concern in the present application was with Group 1 and to a lesser extent with Group 2, but it was not concerned, in the present enquiry, with Group 3, which was too far removed to make it a practicable or economic proposition to interlink the group with the others, excepting for purely emergency measures.

Increasing Output

When certain plant at present under construction was completed, the St. Albans works would be capable of producing 15.1 mill. cu.ft. of gas per day. Watford was capable of producing 4.3 mill. cu.ft. per day, and Hemel Hempstead 1.5 mill., a total of 20.9 mill. cu.ft. per day for the group. Graphs were available showing the steady rate of increase in gas consumption over recent years and the anticipated increase in the future. From 1930 to 1939 the average annual increase in domestic consumption was 4.2%; from 1939 to 1948 it was 6.4%; and having regard to proposed new town developments and other circumstances it was estimated that from 1950 to 1964 the average annual increase would be 3.85%.

Having reviewed the figures for the Greater London Development Plan and those prepared by the Development Corporations the board had decided that it must aim at an output of 27.35 mill. cu.ft. per day from the St. Albans works, involving extensions of just over 14 mill. cu.ft. In the view of the board the works at Watford and Hemel Hempstead were fully developed and were not capable of assisting further in the solution of the problem of increased demand. The St. Albans site was favourably situated with regard to road and rail transport facilities, water supply, disposal of effluents, and distribution of gas.

Amenities

Opposition to the board's proposals was based on the question of amenities, in regard to which Mr. Capewell mentioned that the works had grown up on the present site over a period of 115 years, and that all the surrounding development was newer than the gasworks. It was admitted that in 1947-48 there was an ammonia leakage, but the trouble had been remedied, and in the course of the proposed extensions some of the old plant which had been heavily taxed by wartime demands would be removed and more modern equipment would take its place. From St. Albans Abbey the works could not be seen from ground level, but it was visible from the tower. In so far as it would be visible the new construction would not, in the view of the board, cause any new injury to the amenities. It was not claimed that a works which had grown up over a period of 115 years was an object of beauty, but due regard would be had to architectural appearance in the erection of the modern works, and in the course of the enquiry photographs from Torquay, Pontypool, and elsewhere would be produced as evidence of the pleasing appearance of modern gasworks buildings.

With minor qualifications agreement had been reached between the Hertfordshire County Council and the board, who had agreed to fulfil a series of conditions regarding the submission of plans and elevations, the planting of trees around the site, the painting and maintenance of gasholders, elimination of nuisance from dust and smoke, fumes and smells, adequate arrangements for effluent disposal, road access, and water supplies. The board had offered substantially similar assurances and conditions to the St. Albans City Council, but they had not been able to reach agreement on these matters.

There was already an urgent need for extra gas, and the board had a statutory duty to meet that need as economically and as quickly as possible; for those reasons certain alternative sites which had been suggested had been ruled out.

Mr. J. H. Dyde's Evidence

Mr. J. H. Dyde, Deputy Chairman, Eastern Gas Board, giving evidence, said the board served a population of 626,000 in an area of 688 sq. miles, and gas sales in 1948 totalled 6,487 mill. cu.ft. He was prepared to give an undertaking that the board would remove the existing horizontal retort house at St. Albans in the next six to ten years. There was no intention, he said, of closing the Hemel Hempstead works. He gave an undertaking that on the St. Albans site there would be no further gasholder than that now proposed.

Cross-examined by Mr. Willis, Mr. Dyde agreed that the demand within the city was at present about 3.06 mill. cu.ft. per day, and was estimated to increase to a little over 4 mill., the rest of the gas being required outside the city boundary. When completed, the St. Albans works would be the board's third largest, being exceeded in size only by Willoughby Lane (Tottenham) and Ipswich. On the question of policy he said the board had weighed carefully the relative merits of dispersal and concentration and had decided that the extensions at St. Albans were the only satisfactory solution of the problem.

There was derisive laughter when Mr. Dyde remarked that, before he became associated with the Eastern Gas Board, he had motored past the St. Albans works without noticing them. The inspector called for silence and said there must be no further demonstration.

Counsel mentioned the possibility of exercising compulsory powers for the acquisition of an alternative site, and Mr. Dyde replied that the board, as a unit of a nationalised industry, was reluctant to exercise compulsory powers.

Anticipated Development

Mr. T. C. Battersby, Divisional General Manager, Watford Division, said that in Group 1 they anticipated an industrial load of 42%. Of the present total consumption, 73% was used between 7 a.m. and 7 p.m. The present Sunday dinner time peak load was about 20 cu.ft. per consumer. He produced tables showing estimated increases in the next few years. Reconstruction of existing vertical retorts at St. Albans, due to be completed this year, would add 4 mill. cu.ft. per day to manufacturing capacity and bring the St. Albans total to 15.1 mill. cu.ft. New carburetted water gas plant of 2.75 mill. cu.ft. per day capacity was due to be completed in 1952, representing a net increase of 1.75 mill., as the old 1 mill. cu.ft. per day plant was to be dismantled and eventually rebuilt at Dunstable. Further new carbonising plant was to be completed in three stages, adding 4 mill. cu.ft. per day in 1955, a net 2.5 mill. cu.ft. per day in 1960 (by which time the horizontal retorts were due to be dismantled), and 4 mill. cu.ft. per day in 1963, making an ultimate total of 27.35 mill. cu.ft. per day.

Alternative Sites

Mr. Battersby then dealt with four alternatives suggested by the St. Albans Council, comprising extension of the Hemel Hempstead works and the utilisation of new sites at Smallford, Smug Oak, and Callowland. The existing Hemel Hempstead site was developed to capacity and any extension would mean the acquisition of extra land and the demolition of houses, a church, and/or a public house. The cost would be £331,000 more than for the St. Albans scheme, exclusive of compensation, with £18,000 extra for trunk mains, and £15,000 a year extra for operating costs, apart from capital and interest. Smallford and Smug Oak were both in rural surroundings and the extra costs (compared with St. Albans) would be, in the case of Smallford, £332,000, plus £61,000 for trunk mains and £16,000 per annum operating costs, and in the case of Smug Oak, £357,000, plus £69,000 for trunk mains, and £18,000 per annum for operating costs. The Callowland site was near a residential area and there would be considerable opposition to the construction of a new works there, which in any event would cost £293,000 more than at St. Albans, plus £40,000 for trunk mains, and £16,000 per annum operating costs.

Cross-examined by Mr. Willis, Mr. Battersby said that if the board learned three months hence that its application was refused it would at once warn consumers that there would be a shortage of gas. Then it would look round to see what possibilities there were of bringing pressure to bear on the Government Departments concerned to assist in solving the difficulty. All reasonable steps had already been taken to explore alternatives, and the board was satisfied that its present proposal was the best in all the circumstances.

Lord Verulam's Letter

At the resumed hearing on Thursday, Mr. Capewell said he wished to draw attention to a letter in that morning's *Times* from Lord Verulam 'when two ministers are considering this matter upon evidence given before them. If this were an action the author, printer, and publisher would have been taxed with contempt of court. What I am concerned about are the inaccuracies which appear in that letter,' he said. 'It is stated that the gasworks was working in 1949 to only 40% of capacity. The actual figures were 10 mill. out of a capacity of 11.1 mill.—90%, not 40%.'

There was no intention, he said, of abandoning the Hemel Hempstead works as had been suggested in the letter, nor had anyone any intention of turning the Hemel Hempstead site into an aquadrome. The old company did not possess compulsory powers of purchase and the last two or three sales to the old company in the area were voluntary sales by the estate belonging to the signatory of the letter, he concluded.

Mr. Willis: 'This is not a letter for which the City Council have any responsibility. Mr. Capewell has said the figure of 40% is an inaccuracy—I think it is correct in this sense, that the average daily output from St. Albans works is not 10 but 6.2 which does represent somewhere not far short of 40% of the total capacity.'

Mr. Shoosmith said the Minister would judge the case not on what Lord Verulam said, but on what was said at the enquiry.

Further reference to Lord Verulam's letter was made by Mr. Beecher Bryant when he cross-examined Mr. Battersby.

Mr. Battersby said he did not agree that the gasworks was an 'ungainly bulk' as suggested in the letter. He agreed that the proposed extension involved the erection of yet more very large buildings.

If War Came

Asked if he agreed with the letter that the expansion would be grossly out of scale with the Norman tower of St. Albans Cathedral, Mr. Battersby replied: 'I do not know what is meant by that. We are not designing it with the Cathedral.'

Cross-examining for the Citizens' Committee, Mr. Beecher Bryant asked Mr. Battersby what he thought would happen if there were a war.

'I am not a defence authority,' Mr. Battersby said.

Mr. Bryant: If unfortunately the St. Albans gasworks were knocked out by enemy action, would not the dislocation be worse than if gas production were more dispersed? I am unable to answer that from a defence point of view, but if an atomic bomb were dropped on the St. Albans works, I don't think anyone in St. Albans would want any gas.

Sir Ernest Smith, called as a gas expert by the board, said he thought the St. Albans works looked worse than it was. 'There is a considerable amount of uncontrolled steam, but steam means nothing as regards the appearance of St. Albans but I am afraid it has created quite a prejudice.' There was no reason why a modern vertical retort house could not be quite a pleasant building, and it certainly would not emit smoke and steam.

Mr. Willis: Do you consider the existence of gasworks contributes to the amenities of the Cathedral?—No.

Do you consider it detracts from them?—Yes.

But you don't think very highly of the amenities of the Cathedral?—I don't live here.

Mr. Bernard Wilkinson, planning engineer to the Watford Division of the board, said that the cost of developing alternative sites would be in excess of the cost of developing the St. Albans works.

County Council's Attitude

Opening the case for the County Council, Mr. F. E. Boyce said his council was in the unfortunate position of differing from the local authority. 'This is a matter of considerable importance both to the City of St. Albans and to the whole of the county,' he said. The St.

Albans site was not the site the County Council would have chosen if they had had any freedom of choice, but they came to the conclusion that in this case they had not freedom of choice.

They recognised the policy of integration begun by the predecessors of the gas board and this policy required the use of St. Albans as a gas manufacturing station with consequent expansion of the station.

'My Council further came to the conclusion that there must be gasworks of some sort at St. Albans and with the assistance of the Minister and the co-operation of the board the present proposals offer an opportunity of bettering the present position rather than making it worse,' he said.

Mr. E. H. Doubleday, County Planning Officer, gave evidence concerning the alternative sites which had been suggested for the development and detailed reasons why they were unsuitable.

Mr. Shoosmith announced that the alternative sites would be visited.

A Challenge to Heritage

The first witness for St. Albans City Council was Lieut.-Col. William Foster-Greenwood, Secretary of the Hertfordshire Society, which incorporates the County Branch of the Council for the Preservation of Rural England. He said the Society had considered the matter very fully and took a grave view as to the effect that the proposals were likely to have on the amenities of 'this characteristic and historic city.'

A sketch of St. Albans Cathedral with the gasworks in the foreground was drawn on a blackboard by Professor Richardson, Architectural Adviser to the St. Albans Diocese, when he gave evidence in support of the Council. 'This is a dollar-earning city which attracts visitors from all over the world,' he said, 'and this is the place it is thought to despoil by the creation of what amounts to a slum industrial centre which no amount of tree-lining will obscure. From the railway the gasworks challenge the Cathedral and the heritage that is yours.'

A Bad Legacy

Alderman Cyril Dumpleton, Vice-Chairman of St. Albans City Council's Planning Committee, and former Labour M.P. for St. Albans, said his council had always been conscious that from a planning point of view they had inherited a very bad legacy owing to the existing site of the gasworks. The ideal would be to get rid of it, but he realised there could be no possibility of that being done at the present time.

Mr. John Terrace, called by Mr. Willis as a gas expert, said he thought that difficulties in finding another site could be overcome.

After closely cross-examining Mr. Terrace, Mr. Capewell said: 'A fair summary of what you came here to say is: "Go away and do it somewhere else, but I cannot tell you where or how"?—'Pretty well,' replied Mr. Terrace.

In re-examination he said he did not consider it his province to suggest alternative sites.

Mr. William Robert Davidge, town planning consultant, produced a scale model of the Cathedral which he compared with a table model of the gasworks. The Cathedral, he said, was unique. 'People sometimes forget that St. Albans is a very historic city. There have been two battles of St. Albans—this is possibly the third,' he added, amid laughter. 'In the case of the other two battles, the Government authority was demoted. If you come in by railway you look, hoping to see the Cathedral. But you can't see the Cathedral—you just see the gasworks.' It was most important, he said, that at this juncture nothing should be done which would make it more difficult for the next generation to do the right thing—which was undoubtedly to place the gasworks elsewhere.

A Question of Planning

Summing up the case for the City Council, Mr. Willis said that the question was whether it was in accordance with good planning that St. Albans should become a vast regional gas production centre. The Council contended that there were a number of alternatives by which the perfectly legitimate objectives that the gas board had in mind could be satisfied without extending the present works. The board said that planning was someone else's responsibility; that their duty, and their sole duty, was to manufacture gas and supply gas to the public at the cheapest possible price.

Mr. Willis suggested that to install new buildings at the gasworks situated on the main beautiful approach to the city and under the shadow of the Cathedral was deplorable. One of the main considerations from the council's point of view was that if about £2,000,000 was spent on expanding the works there would be very little prospect of the works ever being removed altogether, as the city council hoped would happen.

When the case for the Citizens' Committee was opened, the first witness was the Committee's Chairman, Mr. Frank Mercer, who handed in a petition signed by 5,441 people protesting against the proposed extension.

Mr. Mercer said he was Governing Director of Thomas Mercer, Ltd., whose premises were near the works. From 1936 onwards there had been a constant stream of complaints of the almost unbearable conditions under which they had to work.

Fumes and Noise

Dr. Tom Hare, of 70, Holywell Hill, St. Albans, said he lived 500 to 600 yards away from the works and was intermittently troubled by fumes. He was also troubled by the noise of clanking machinery at night which was more noticeable now than it used to be.

Mr. John S. Godman, Works Foreman to Thomas Mercer, Ltd., said that since 1930 the inconvenience from the gasworks had intensified each time alterations were made. The noise continued throughout the 24 hours and that also was intensified. In 1947 he wrote twice to the Town Clerk and was told that the attention of the gas board would be drawn to the matter. No improvement, however, had been made.

Miss Vera Kingston, of 25, Prospect Road, St. Albans, gave evidence of 'pungent smells' and fumes which she alleged were emitted from the works. Because of these fumes it was difficult to keep the house clean.

Mrs. L. Peck, of 18, St. Julians Road, said that one day she was hanging out her washing when fumes came over from the works causing her to sneeze so violently that she had to hang on to her clothes post.

Summing up, Mr. Beecher Bryant said the County Council were entirely wrong in deciding not to oppose the application. They were misguided, and they did not have the proper aspects of the matter before them. He asked the inspectors by their recommendation to protect the historic city from further prostitution by the Eastern Gas Board.

Mr. Capewell pointed out that if the gas board was forced to develop another site, which would be more costly, the cost would have to be borne by someone. If it were borne by the City Council, this would result in a 1s. 11d. rate, if by the County Council, a 2½d. rate.

Mr. Shoosmith closed the enquiry after a hearing lasting three and a half days and announced that the findings of the Ministries concerned would be promulgated.

Golf Tourney in Wales

In the early part of July there arrived at the headquarters of the Wales Gas Board a document of imposing aspect. This contained in modest, but confident, terms a challenge from certain 'humble servants' of the board to the members and headquarters officers, to play a match at golf.

The challenge was accepted and on the evening of August 3, at the Whitchurch Club, the match took place with headquarters and undertakings each winning two matches. Results: W. Clark Jackson (Coal Officer), W. R. Branson (Planning Officer) (Headquarters) lost to G. Boardman (Cardiff), J. Powdrill (Pontypool) (Undertakings). T. Mervyn Jones (Chairman), Trevor Morgan (Chief Accountant) (Headquarters) beat D. I. Rowlands (Rhymney and Aber), W. E. Griffiths (Rhymney and Aber) (Undertakings). R. S. Snelling (Deputy Chairman), J. C. Clay (Board member) (Headquarters) beat A. E. Berridge (Cardiff), A. Stichbury (Newport) (Undertakings). S. J. James (Chief Clerk), J. T. Rees (Internal Auditor) (Headquarters) lost to D. T. Phillips (Aberdare), H. S. Bartlett (Cardiff) (Undertakings).

So certain is each side of victory on another occasion that a return match is likely to be arranged. The result was thought appropriate by those well versed in Section 41 of the Gas Act, 1948, for 'taking one (player) with another,' both headquarters and undertakings found at the end of the evening that their revenues were not less than sufficient to meet their outgoings.

An enjoyable supper was taken after the game with the Captain and Secretary of the Whitchurch Club to whom Mr. Mervyn Jones expressed the players' gratitude for their hospitality. Mr. R. S. Snelling thanked the 'humble servants' for their challenge which had produced such a delightful evening, one he hoped which would be repeated.

Grid Developments in Wales

Price of Coke Oven Gas

MR. T. MERVYN JONES, Chairman of the Wales Gas Board, addressed members of the Welsh Board for Industry under the chairmanship of Sir Percy Thomas at Cardiff on July 28. Pointing out that the board was now responsible for 108 gas undertakings scattered over the 8,000 square miles of Wales and Monmouthshire he underlined the expansion of the industry by saying that in Wales as a whole they had seen the largest percentage increase of any area board. The extension of the industrial load this year had been particularly marked, at Merthyr Tydfil 46%, Cardiff 30%, Rhondda and Rhymney Valley 22%.

He quoted the case of Newtown (Montgomery) where a wartime factory now converted to the production of bicycles consumes in gas an amount almost equivalent to the total former demand, and, directly as a result of improvements in supply achieved there, its activities were now being extended. Their present estimate was that more than 80% of gas made and sold in Wales was in the development area.

Mr. Mervyn Jones went on to describe the functions of the eastern grid now in course of construction and designed to serve the needs of West Monmouthshire and East Glamorganshire. It would be fed from the new works at Pontypool, Bedwas non-vested coke ovens now supplying Newport, the Guest Keen coke ovens now supplying Cardiff and existing other plants where necessary, and finally, they hoped, the Nantgarw N.C.B. coke ovens when they were in operation.

The western grid would serve the needs of West Glamorgan and East Carmarthenshire. In Pembrokeshire, a grid scheme to supply the county south of the Haven, and Neyland and Milford Haven north of it, from the Pembroke district works had been prepared.

As to 'tail' gas from the oil refineries, an investigation was being carried out by a technical and financial officer from the National Oil Refineries and the board into the distribution and marketing of this gas in the district around Llandarcy, for industrial or other purposes—an investigation proceeding, he was delighted to say, in an atmosphere of the utmost cordiality.

Dealing with the recent increase in gas prices Mr. Mervyn Jones said that in the areas about to be served by the main grids there would, he hoped, be an early move by the board in the direction of a revision of industrial gas prices. But before they could start on this they had to settle with the coke oven gas producers the terms and conditions on which they would take their gas. 'I feel that I must say we are concerned to find that prices are now being asked for coke oven gas in excess of twice the amount of those formerly demanded and now being paid by us in respect of gas from existing gas ovens,' Mr. Jones concluded. 'This is a most vexed question and the one point we as a gas industry seek to stress is that the price to be paid to the producers of coke oven gas must at all times be related to the price which can be obtained from the consumer. We are most anxious to meet the fair and proper demands of all coke oven producers, the N.C.B., the steel companies or any others, and to establish relations with them not only fair but friendly; but we know that the greatest disservice we could do to the industrialists and to Wales as a whole would be to commit ourselves, and the public money, to buying large quantities of gas at a price that, with the addition thereto of the proper costs of distribution, would result in one at which gas in such quantities could not be resold.'

C.W.G. Plant Contract

The North Thames Gas Board has placed a contract with the Power-Gas Corporation, Ltd., for the installation at Beckton of three units of carburetted water gas plant having a total daily productive capacity of 18 mill. cu.ft. of gas with a calorific value of 520 B.Th.U. per cu.ft.

This is one of the largest single contracts for this type of plant ever placed in this country and of general interest to gas engineers will be the incorporation of various features novel to carburetted water gas practice in Europe. Included in these is the patented reverse flow process, which, together with the three-way combined uprun and backrun changeover gas valve and elevated cone base wash box, are developments of the Semet-Solvay Engineering Corporation of the U.S.A., with whom the Power-Gas Corporation have collaborated. Such features are particularly useful if heavy oil has to be considered for enrichment.

Ancillary equipment generally is steam driven, arranged to exhaust against a back pressure of 15 lb. per sq. in. into a steam accumulator, supplying, together with the steam raised in the annular jacket boiler the process requirements of the plant, while the waste heat boilers working at a pressure of 300 lb. per sq. in. supply steam required for auxiliaries.

Each generator, which is of the dry base type suitable for blast pressures of up to 42 in. W.G., is fitted with a cyclic charging device which is removable at will from the charging position on the generator top to permit of overhaul and maintenance work without steaming down the generator firebed. A normal charging door comes into operation upon removal of the cyclic charger.

Automatic cyclic control will be by the P.G.C. oil-hydraulic system, which embodies Lockheed equipment designed for operating at pressures up to 1,000 lb. per sq. in. The controller being of the single camshaft type with double cams for each control valve is capable of adjustment for both duration and make-up of the gasmaking cycle, while synchronising equipment is provided to keep the plants 'in step.'

The contract includes the necessary civil engineering work involved and for a reinforced concrete building to house the plant and its ancillaries. Site work is scheduled to commence with the driving of piles early next year.

At the recent annual conference of the Cremation Society at Blackpool Radiant Heating, Ltd., exhibited a scale model of a gas-fired cremator which aroused considerable interest among members of the Society. Our photograph shows a representative of the makers explaining its features to one of the visitors.

Purchasing Officers' Association

The Sheffield branch of the Purchasing Officers' Association held a dinner on July 21 to mark the occasion of the annual conference of the Hon. Secretaries of the Association's 30 branches, held in Sheffield, and also the visit of the National Council for a meeting in Sheffield the following day.

Mr. W. F. Fisher (Newton Chambers and Co., Ltd.), presided, and the principal guest was the Master Cutler, Mr. W. R. S. Stevenson, who proposed the toast of 'The Association.' Bulk buying, he said, had great dangers and could not be divorced from political implications. Although centralised purchasing was theoretically correct, it was likely to lead to harmful rigidity unless proper care was taken to avoid this danger.

In response, the President of the Association, Mr. T. F. Turner (English Electric Co., Ltd.) said that buyers found that trade associations' restrictions could be just as rigid in effect as governmental controls. He claimed that the terms given to nationalised industries should not be more favourable than those granted to individual firms.

EDUCATION AND SURVIVAL*

By D. T. A. TOWNEND, D.Sc., Ph.D., D.I.C., Hon.M.Inst.Gas E.

THE fuel technologist, more than anyone, is aware of the changes in our economic structure which were precipitated in 1914—changes which, although then unanticipated, were none the less inevitable. As is well known, 1914 marked the peak of this country's coal production. It also marked the peak of coal export, the quantity representing almost one-third of the whole of production. These amounts had risen without interruption throughout the 19th century, both sustaining and being stimulated by the revolution in industry; simultaneously came increasing prosperity, improvement in the general standard of living, and development in education and knowledge. As one index of prosperity—and not the least significant—we may take the coal tonnage produced per head of the population. In 1850 it was 2.5; in 1914, 7; but today it is 4. It was not well appreciated in 1914 to what extent our national prosperity was dependent upon the export of coal; nor the extent to which this factor also determined Great Britain's shipping supremacy.

It would be out of place here to elaborate the various causes responsible for the progressive decline in coal output and export since 1914. These are well known and would be less serious were it not that, following the almost complete loss of invisible exports after World War II, Great Britain now finds herself seriously impoverished. Thus today we are faced with a problem of 'survival' and with the realisation that this must depend almost entirely upon our achievements in science and technology; in consequence there arises the urgent need to train men and women of adequate calibre and employ them in industry. In no field of endeavour is this of greater importance than in fuel technology. Real issues are involved; how far are our present systems adequate, given proper support, and how far and in what direction should changes be effected?

Our Educational History

We are essentially a nation in the evolutionary tradition. At a time when it is thought that changes may be necessary, particularly in regard to the training of technologists, it is opportune briefly to review the growth of our educational system and examine whether we may have failed in the past, and, if so, why. The British people are peculiarly adaptable to circumstances; and I think it can be shown that progress in education during the century before 1914 was not out of line with progress in economic developments. But since 1914 we may have been slow to appreciate the true significance to our educational system of the rapidly changing state of the national economy.

We can certainly look back upon the educational history of this country with some pride, but we must make sure that we learn the right lessons. Lord Eustace Percy, addressing one of the London Colleges some few years ago, remarked that: 'While it is the periods of fertility, the periods when ideas and aspirations are being developed, that are the real eras of progress, it is in the subsequent periods of organisation that mankind is most apt to preen itself on being progressive. In the periods of fertility men do not realise the progress that they are actually making. It is only when they begin to consolidate that progress in a later era that they become conscious of being very progressive indeed.'

The achievements of our industries today are indeed impressive. But so also is the vast mass of scientific data and the wide range of scientific tools and techniques at our disposal. When we look back to the first half of the 19th century, we realise how large was the ratio of achievement to the means available, and we are at a loss to account for that except in terms of the vitality and spirit of enterprise and adventure which our predecessors possessed during those fertile times.

We should look to our educational system as the most potent weapon in our fight for survival, and, it is therefore fitting to take note of the manner of its growth.

In 1800 there were few schools other than the ancient public and grammar schools. Their influence was—and is—important; but there was no system of popular education and there were no professional institutions, practically no learned societies (except the Royal Society) and only some six universities, of which four were in Scotland and two in England. The two English universities were at low ebb—so that a freshman at one of them could write: 'All I can expect to learn here is how to pray and how to drink.' The pressure for educational development arose directly from a spate of industrial inventions and in the wake of the social unrest following the French Revolution. The first move came in the inception in Glasgow of the Mechanics Institutes. It should be interposed here that the educational position in Scotland was vastly better than in England. North of the Tweed there was already an element of popular education, and though their work suffered from a lack of system, the Scottish universities were centres of intense intellectual activity in contrast to which (according to the historian Halevy) the two English universities were 'agglomerates of a species of lay monastery where celibate Fellows resided with their pupils'! Times have indeed changed. The two ancient universities much reformed, yet still following their traditional ways, today form the double crown to the whole university life of this land.

The Mechanics' Institutes

The Mechanics' Institutes movement may be considered to have begun in 1800. A physician, Dr. George Birkbeck, was lecturing in science at the Andersonian Institute; his need for scientific instruments brought him into touch with instrument makers, whose great eagerness to learn something of the scientific principles behind the great contemporary inventions led him to institute for them a special science class. By the end of its first term the class had 500 students. In the next 20 years this work became established in the form of the Glasgow Mechanics Institute. Meanwhile, Birkbeck had trekked to London, where the fame of his Glasgow experiment had gone before him. In 1823 a group of London mechanics, meeting in the Crown and Anchor Tavern in Fleet Street, decided to form a similar institute and invited Birkbeck to become their first president. The principal object of the London Institute, as declared in the resolution passed at the meeting, was 'to make the people acquainted with the facts of chemistry and of mechanical philosophy and of the science and distribution of wealth.' By 1840 there were over 200 such institutes and by 1860 about 750, mostly in the towns of the industrial north.

To complete our picture, a brief word on elementary education is necessary. The first moves towards a system of junior education came in 1808 when Lancaster, the Quaker, and, in 1809, when Bell, the churchman, formed their respective voluntary societies. The National Society, organised by the latter, had opened, by 1830, some 13,000 schools attended by over 400,000 children. Hitherto not a penny of public money had been given in support, but in that year the Whig Government voted £20,000 in aid of the various voluntary efforts.

The First Modern Universities

The University of London, the first of the modern universities, excluding Durham, was founded in a curious way. On February 9, 1825, *The Times* newspaper published a letter from the poet Campbell, pleading for the establishment of a great London University. In 1827 a joint stock company was formed under the name of 'The Proprietors of the University of London,' and subscriptions were invited. The new body was purely secular, a feature which inspired Arnold, of Rugby, to refer scathingly to 'that godless institution in Gower Street.'

* Presidential address delivered at the general meeting following the annual luncheon of the Institute of Fuel, in London, April 27, 1950.

Its efforts to obtain a Charter were fiercely opposed; indeed, a public meeting was held in 1829, presided over by the Prime Minister, and attended by Wellington, to found a rival college where the doctrine and worship of the Church of England would be recognised. This College immediately received royal patronage and a Charter, becoming King's College (London). University College, established by the Joint Stock Company, did in fact receive a Charter in 1836, and the two Colleges became incorporated as the University of London.

The first professional body was the Institution of Civil Engineers, founded in 1818 and chartered in 1828 with the very comprehensive objective of 'promoting the acquisition of that species of knowledge which constitutes the profession of a civil engineer, being the art of directing the great sources of power in nature for the use and convenience of man.' The Institution of Mechanical Engineers followed some 20 years later (in 1847), George Stephenson becoming first President.

We cannot fail to recognise the first half of the nineteenth century as a period of most remarkable fertility and vitality, and of exceptional significance to the rise of education. Two underlying features are particularly worthy of note; one is the deep impression which science and invention had made, and the other the outstanding part played by voluntary agencies. Assistance by the State was slow to come and slow to grow. Indeed, State action was strongly opposed, often from the most surprising quarters. Boyd, for example, in his recent 'History of Western Education' comments that 'apart from politicians and "sectaries," the most uncompromising opponent of national education was Herbert Spencer.' Although 'he was entirely opposed to the literary traditions of the schools and firmly believed that the knowledge of greatest value in every way was science, he had a great mistrust of State action in any form beyond the narrowest limits.'

The first major steps in State intervention were the School Board Acts, introduced by Gladstone in 1870, followed by the introduction of universal compulsory education by Disraeli in 1876 and 1880; by the latter year the State grant had reached the substantial sum of £2 mill. With the long period of inception over, in the passing of these Acts, the national compulsory education system grew rapidly. The next 30 years or so saw a steady flow of legislation, and the Exchequer grant rose fivefold—*i.e.*, to £11 mill. in 1907.

Rise of the Modern Universities

The growth of university education, as judged by present-day standards, was slow during the 19th century. No significant foundation, other than London and Durham, occurred until that of the Manchester College, founded by John S. Owen in his benefaction of £100,000 and opened in 1851; the Victoria University was not chartered until 1880. University College, Liverpool, received its Charter in 1881, was incorporated in the Victoria University in 1884, and attained status, as the University of Liverpool, in 1903. The Yorkshire College of Science, founded by subscription 'to supply instruction in those sciences which are applicable to the manufacture, engineering, mining, and agriculture of the County of York—and also such arts and languages as are cognate to the foregoing purpose,' was opened in 1874 in rented premises. Its Charter was not granted until 1904. The two Birmingham Colleges, Queen's and Mason's began in 1880, and the University of Birmingham received its Charter in 1900. Firth College was chartered as the University of Sheffield in 1905; and Bristol (formed as a University College in 1876) in 1909.

These movements, springing from non-comformist and industrial circles which had been excluded from the two ancient universities, were all inspired by voluntary action and financed by private benefaction and public subscription. It was in 1889—but 60 years ago—that the first grant to universities was made by Parliament; this was a sum of £15,000, considerably less than 0.5% of the grant made for general education. By 1901 this had been increased to the sum of £25,000, to be shared among some 15 of the rising universities and colleges! An interesting stipulation was made for participation in the 1889 grant; this was that the colleges performed 'an appreciable amount of advanced university work.'

It is instructive to note the progress of the universities since 1901; in that year their total student population was just under 8,000, of which about one-half were full time in arts and science and the other half in technology and other activities, whole or part time. Their total income (1901) was £200,000, of which one-eighth came from Parliament and the remainder equally from fees and voluntary sources. By 1924 the number of students had risen to 42,000 and Parliamentary grant to just over £1 mill. By 1947 the total was nearly 80,000 and Government grant about £9 mill. within a total income of £16 mill. The progress achieved since 1924 has obviously been considerable. To those who have assisted in this (we should recall especially the more recent action of Sir John Anderson when Chancellor of the Exchequer) the country has much cause for gratitude. But let us not forget that over the same period the revenue from taxation rose to a tremendous extent also. Whereas just before World War II it stood at £1,000 mill. (national income £4,640 mill.)—of which £2 mill. was allotted to the universities—in 1947 it was £4,000 mill. (national income £8,725 mill.) and the university grant £9 mill. Actually, therefore, the ratio has scarcely changed. And having in mind that the total university income in 1947 (£16 mill.) is the approximate equivalent of the aggregate cost of one cigarette per week per head of the adult population, and bears a similar relation to expenditure on other non-essential forms of expenditure, there is surely need for further awakening of the public conscience.

Technical Education

Turning now to technical education, it is sometimes thought that this really began in the foundation of the Mechanics Institutes. This is not strictly true, for those institutes arose and flourished out of the desire for intellectual adventure and were in no sense vocational. Probably the greatest impulse came from the 1851 Exhibition conceived 'to exalt husbandry and industry and ignore the power of the sword' (a reference to the then troubled state of foreign affairs). The great architect of the Exhibition, the Prince Consort—impressed with progress on the Continent in applying science to industry, and also with the development of continental education—pressed forward the project against the fiercest opposition; it met with great success and the Prince personally superintended the disbursement of the substantial profit of £186,000. This was used to acquire the South Kensington sites, to found there the science schools and museums, and to institute scholarships. Another outcome was the creation of the Department of Science and Art for the object of developing a distinct emphasis on scientific and mathematical studies.

Specific mention must be made also of the important pioneering work of the City and Guilds of London Institute which in 1879 began to give active support to technological instruction. And in 1883 the City of London Parochial Charities Act was passed with the object of fostering the development of polytechnic institutes in London. Following this, the Local Government Act (1888) instituted the county councils; and in 1889 and 1890 the Technical Instruction Acts made provision for organising technical and manual training and empowered the new councils to raise funds for the purpose up to the limit of a penny rate. These Acts were passed at exactly the same time as Parliament made its first grant to universities and colleges.

Between 1889 and the formation of the University Grants Committee in 1919, Parliament was informed of university progress in annual reports by special commissioners. In the report for 1901 it is stated that 'Technical institutes are growing up in all large towns.' After a reference to 'a certain amount of rivalry, friction, overlapping,' &c., the comment is made that 'in the technical departments of a university, technical education is lifted to a higher plane.'

Between 1889 and 1899, there was great activity in the provision of sites and buildings for schools in science, art, and technology. In the latter year the Science and Art Department became merged with the Education Department of the Privy Council to become the Board of Education; and the Education Act of 1902, which abolished the school boards, made the county councils responsible for providing technical education.

Since 1902 there has been further important legislation which culminated in the great Act of 1944. Informed comment is that if this Act is regarded merely as the framework of a new progressive educational service, and if everything possible is done to implement it, then it is likely to be one of the greatest social reforms of the century.

The Civic Universities

Looking back, we note how fortunate it was that the five Northern—or so called Civic—Universities, as well as the Imperial College of Science and Technology, were founded at the turn of the present century, soon to be followed by Bristol University. At the time the nation was still enjoying the prosperity arising from the Industrial Revolution.

There can be no question of the influence of these universities in their contribution to technological education in this country. And having in mind the particular needs of the moment, it is appropriate here to refer to the recent (1944) words of Sir Charles Grant Robertson, who, when speaking of the problem of higher technology in science, said: 'This highway must be constructed and kept open, and it is above all for the civic universities to build it, situated as they all are, with the possible exception of Reading, in large industrial areas with industry of every kind at their doors, with a large human personnel and the material equipment waiting for a bothways traffic to flow along it. What is the best way to it can safely be left to the universities to decide, provided that the will to achieve it and the driving force are really strong—and the need now is pre-eminently national and urgent. In making the road the civic universities will be remaking themselves, and placing university studies not only into a unifying relation with reality but in teaching the whole nation that a liberal education is not confined to the purely humanistic disciplines. Of course, *it will cost money, and much money.* The representatives of physical and natural science are now rightly framing their programme and estimating the cost of carrying it out. *Once again the nation will have to decide not whether it can afford it, but whether it can afford to do without it.* And though it is the weakest (if any) argument for the case, it will in the long run, perhaps even in the short, pay in the monetary sense.'

These universities, centred in our great cities and closely in contact with the needs of industrial areas, have participated in what has been termed the Renaissance of Science; and the Institute of Fuel will always be mindful of the profound influence of the great School of Combustion established at Manchester University by H. B. Dixon in the 1880's and 90's. In its direct succession came the Departments of Fuel Technology at Leeds, at the Imperial College of Science and Technology (London), at Sheffield, and at Birmingham.

We must now reflect on how much stronger might the present position have been had proper attention been given during the inter-war years to the facilities already available at these universities. This is a matter for reproach not only to the governmental policy of the day, but also to industry and to the public conscience which was equally lacking in imaginative sense.

One problem has been the classical bias in secondary and public school education. Nations, like men, may not live by bread alone, but they cannot live without bread. Our food depends upon the use we make of the resources of nature, and in an industrial country this involves technology. And how frequently has our scholarship system—after training the brightest young brains in an industrial area—afterwards led them away into remote academic fields?

One can also well remember periods when university research laboratories were filled mostly with men from abroad, British students being in a minority. There is no objection to the education of foreign students in British universities. Indeed there was a long period, terminating with the World War I, when German universities encouraged and gave hospitality to British students, who thus received their education partly at the expense of the German taxpayer. Yet it is a reflection on the general outlook during this period that the opportunities made available by British endowment and taxation were not turned to better account in the training of the rising generation in this country.

In quite recent years all university departments have been filled beyond capacity by the return of ex-Service students, but as times become more normal, we must see to it that no able student is debarred from following technological courses by lack of financial support. In view of the increasing level of taxation and the elimination of personal capital, fewer and fewer families will be able in future to help their children to take advantage of these facilities. It is imperative, therefore, that more and more State grants become available to maintain students, particularly those desiring to enter technology; and it is satisfactory to note the recent decision of the Ministry of Education to award 120 technical scholarships, many of which will be tenable at universities. But more are required.

Another reflection on the inter-war years has been the inadequacy of the finance necessary for adequate equipment and staffing; enquiry would show that most of the departments in question were unable to maintain more than one or two capable men as teachers, and were provided with merely a few hundred pounds a year for maintenance. Even so, most of the funds, studentships and fellowships, were forthcoming from industry; indeed, the picture has been almost entirely one of university professors having to go 'cap in hand' to industry. If we can ensure that such days never return, I do not feel that we shall have any cause to complain of the output of competent young men from our universities or of the developments in technology which will be forthcoming.

Technology in Universities

Many technological departments in our universities function under the guidance of advisory committees, whose members are representative of all interests; an example well known to us is the Livesey Advisory Committee at Leeds University, which has worked so successfully since the endowment of the Livesey Chair in 1910. I am sure the part played by this department, of which I personally have had such intimate knowledge, needs no emphasis here.

Another important field in which such university departments are playing an important part relates to collaborative research. The Department of Coal Gas and Fuel Industries at Leeds University has collaborated for more than 40 years, firstly with the Institution of Gas Engineers and latterly with the Gas Research Board, in the elucidation of problems of direct importance to the gas industry. The iron and steel industry (latterly the British Iron and Steel Research Association), as well as the British Electrical & Allied Trades' Research Association, have likewise collaborated with several universities; and at the present moment the British Coal Utilisation Research Association collaborates with both the University of Sheffield and the University of Leeds.

An illustration of the successful prosecution of the special research of an industry at a university is the work of world-wide reputation undertaken by the Glass Delegacy at Sheffield University. The Delegacy is constituted of representatives of both the University and the industry, and any industrial concern may have its own problems studied by special arrangement. It is unnecessary to emphasise the great value of such work, both to the industry and to the university; the degree student grows up in immediate contact with investigations concerning the industry which he is about to enter; and, as I have many times emphasised, frequently advances in pure science result from investigations into industrial problems.

Present Needs in Technological Education

I have with intent laid stress on the part played by our universities and their great potentiality for the future. There have been many recent discussions on such topics as 'The Idea of a University,' 'The Crisis in the University,' 'The Case for the Technical University,' and 'Higher Education for Technologists,' and so on. Many of them have appeared in the Press and may be commended as showing the current trend of thought. There is, however, every reason for confidence that the universities will continue to serve us well in in the future.

As well known authorities have reiterated, British universities are the creation of the British nation, and not of the

British State; they are mainly the outcome of endowment and subscription. Their autonomy is in line with the British tradition of 'spontaneous cohesion,' and to respect the autonomy of the universities is in line with this tradition. Fortunately, in this country Government has found a technique which enables it to give financial support to universities while leaving them a large measure of elbow-room unexampled elsewhere.

In a recent address, Professor Sarjant stated clearly the function of the universities in technological education: 'The function of the university in this respect is to give such a foundation of fundamental principle, technological experimental exercise, general broad outlook, and skill in the methods of investigation as may enable the student to meet the technical requirements of the industry. This does not imply that he must of necessity be a competent research worker; such men are in many respects born, not made. Any student must, however, be able to solve the problems he inevitably encounters in abundance in industrial life. Industrial technical practice is, in effect, a job of solving an unending sequence of problems. A man must ultimately revert to a stage of humdrum ineffectiveness who has not acquired the habit of finding in the every-day occurrences of an apparent routine character intriguing problems from which technical progress and discovery may emerge.'

There need be little doubt that today technological departments in universities are working along the right lines. Given adequate financial support they provide the correct milieu to produce the best type of schooled technologist; for it is vital that he be provided with adequate knowledge of the sciences upon which his particular form of technology is based, as well as with an equally adequate knowledge of the art in which he specialises. Within the framework of the university it is vital that pure science departments are provided with every facility for free-lance investigations into fundamental problems; these are frequently quite remote from current industrial practice. But it is equally important for scientists in applied science or technological departments to be engaged as a primary interest upon investigations into industrial problems; provided these tasks are undertaken by men schooled in modern thought and method, progress to the advantage of both pure science and industry will inevitably emerge. Success depends upon reciprocal service between both types of department.

The Technical Colleges

There is no doubt that a degree at a recognised university is a most valuable prize for the student and that the maintenance of degree standards should be jealously guarded in any extension of degree-granting privilege to higher technical colleges. But this should not be accompanied by any general feeling of superiority or reluctance to grant university status to those colleges which have developed on the right lines. On the other hand we must remember that technical colleges fulfil a very definite need in training men for work in the teams so characteristic today of all technological activity. The contribution by students from technical colleges to the national welfare and to productivity is just as important as the leadership towards new developments. The Percy Committee accepted a figure of 150 as roughly the number of technical colleges in England and Wales which provide courses within the meaning of higher technological education. The students are known to number well over a million, of which fewer than fifty-thousand are full time. The great army of voluntary part-time students deserves the greatest encouragement.

The problem of education in technical colleges, though linked with that in universities, requires an independent approach; and in my view the two fields should not be confused. Technical colleges have been maintained and controlled by local authorities; consequently their size and scope have varied mainly with locality and financial resources. While generally they have catered for artisans and, maybe, process managers, a few have provided education up to university standard. In this connection the recommendations of the Percy Committee are important. These embodied: (a) the selection of a small number of technical colleges as national colleges, each with maximum academic and financial freedom and supported by the National Exchequer as in the case of universities; (b) the establishment of regional advisory councils concerned with the co-ordination of technical status in the universities, colleges of technology, and other technical colleges of the region; (c) a national counterpart of (b) in a national council representative of regional advisory councils and of regional academic boards; and (d) the establishment of management studies as part of the courses.

It is clear that some central authority is desirable, but it may be doubted whether it should be so ambitious that its responsibilities should (a) embrace the advanced technological education so well covered in our universities, or (b) usurp the functions of the professional institutions. The Committee in suggesting management courses has pointed out a real need common to both universities and technical colleges; for today how frequently do we find otherwise able technical staff 'managed,' instead of 'managing'?

Professional Institutions

In technology, the teaching institutions can, and must, provide the necessary foundation, but the 'finish' is provided by industry itself. In this purpose the *professional* institutions are the principal medium. At their meetings the experienced, older men convey what they have learned to the newcomers, and the newcomers, in their turn, try their hand in the application of the latest developments in various branches of science.

Today we have, in the professional institutions, another example of voluntary effort. These institutions were set up by men desirous of establishing and maintaining standards in their profession and of taking part in organised discussions of its development. I have already mentioned that it is these institutions which round off technological education, which set the seal on a man and his work, which disseminate through their journals recent advances, and which in their various grades of membership cater for all levels in technology. The actual and potential value of the professional institutions as voluntary and experienced agencies with wide liberty of action and opinion is very great. I suggest it would be a bad thing indeed were anything done now or at any time which may tend to lessen their obligation to keep education in the forefront of their deliberations.

We must regard education today not as an unfortunate necessity in order to provide qualifications for our varying industries and professions. Education itself is a key industry which will bring its own returns. The prosperity of the Industrial Revolution depended not only upon our indigenous coal and its export, but also upon our inventive genius. Now that our coal holds a less dominating position, surely it is commonsense that we should again commercialise our inventive genius; and science and technology lie at the back of this. And we note particularly the ability of a country like Switzerland, having no natural energy resources other than water power, successfully to compete in world markets with the manufacture of fuel-burning equipment.

The survival of our nation depends not only on rapid progress in technology but also on the advancement of technical development. As professional men in fuel technology we are responsible for one of the basic industries on which our national wealth depends.

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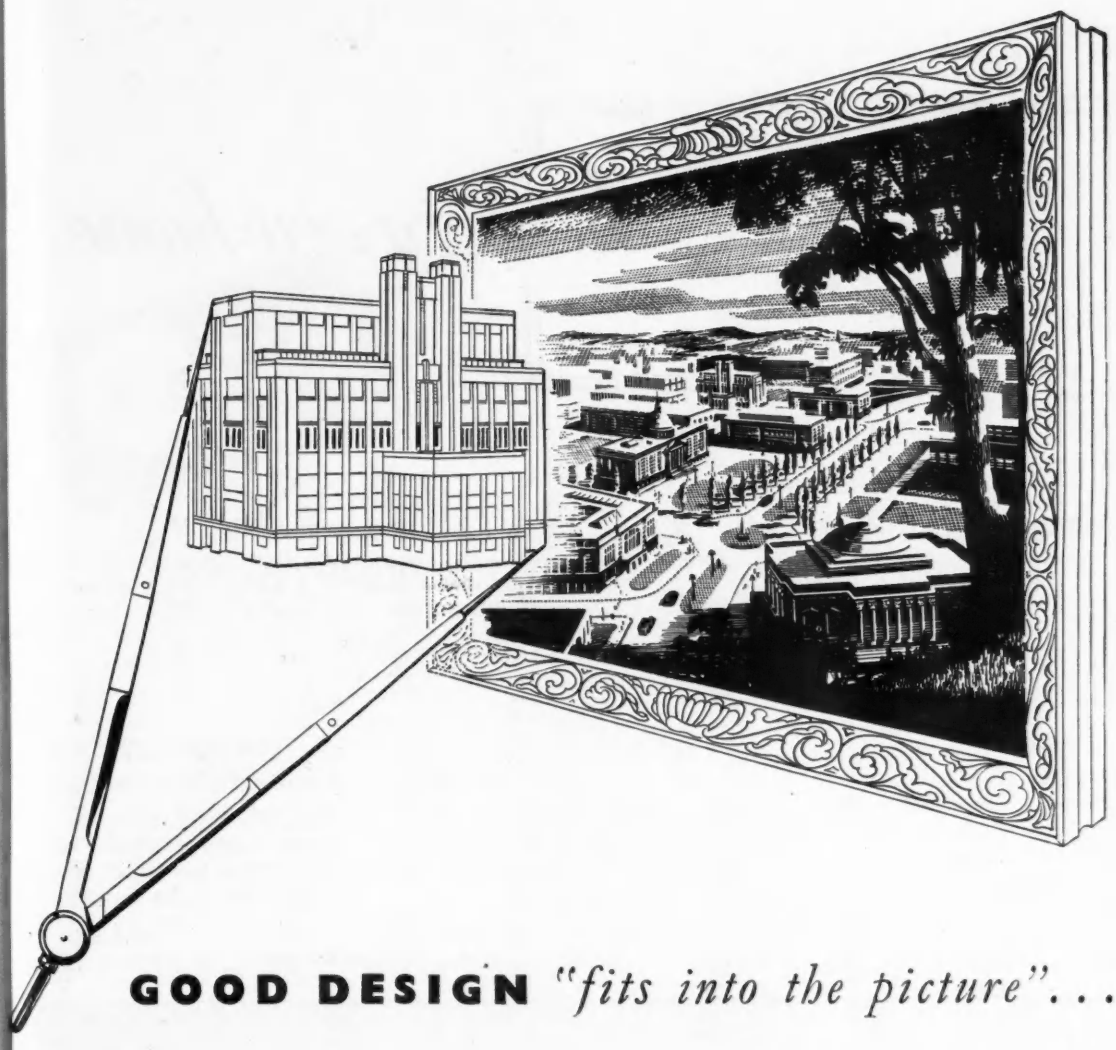

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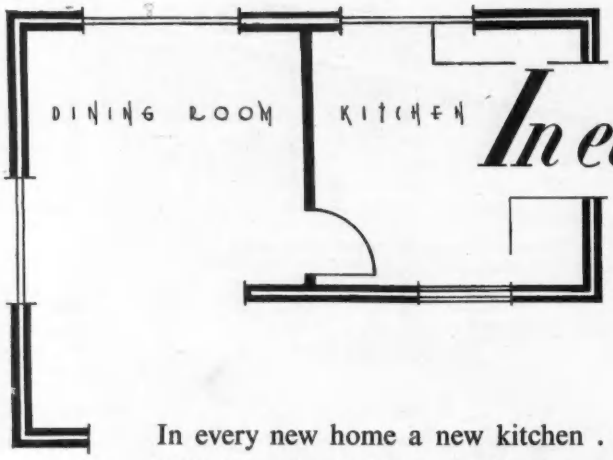

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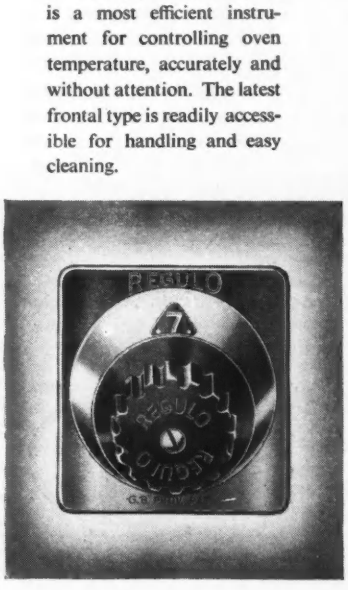

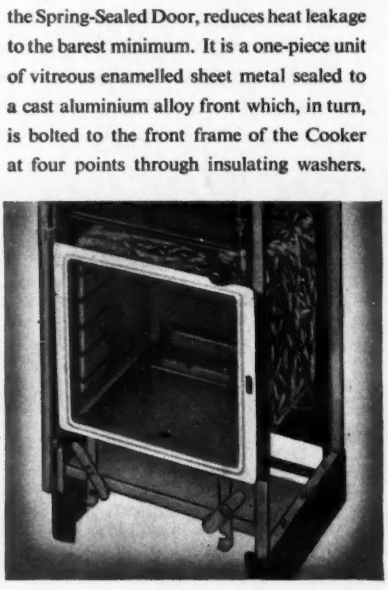

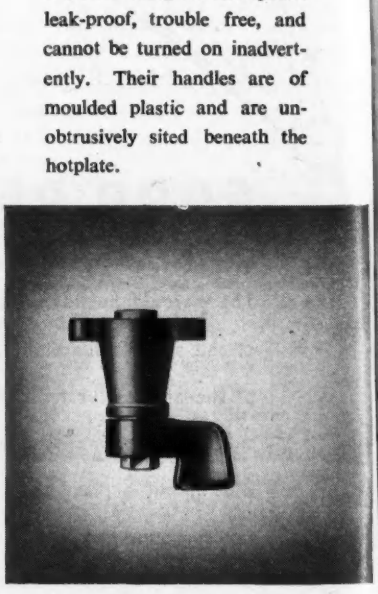

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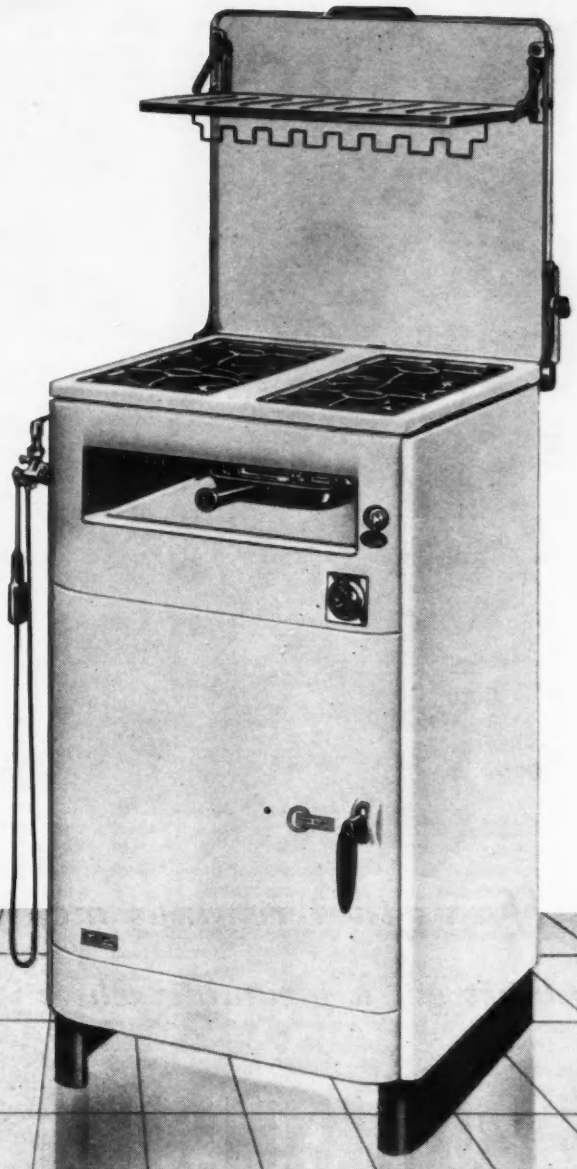

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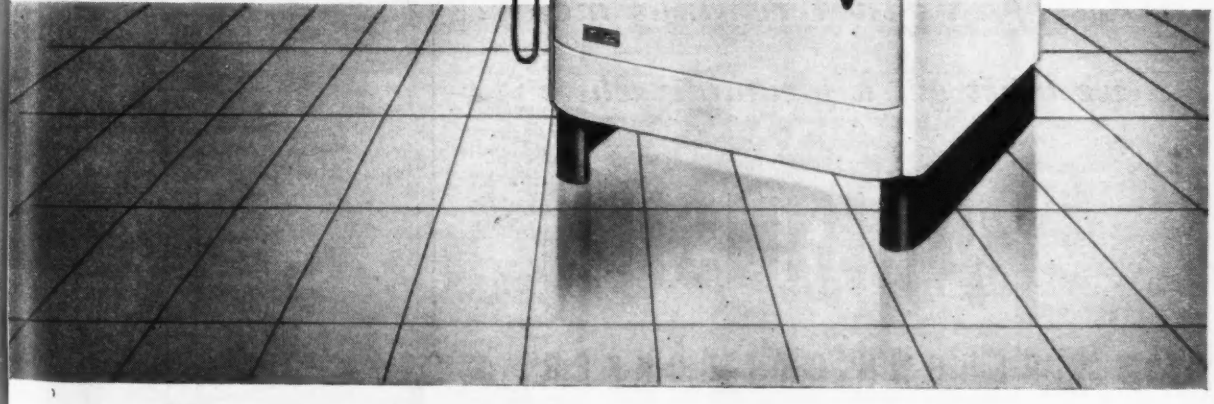

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THE JUNIOR ASSOCIATIONS IN POST-WAR YEARS*

By A. H. SAVILL, M.Sc., A.R.I.C.,
West Surrey Division, South Eastern Gas Board.

AS a result of nationalisation the senior Associations have decided to change their constitution and to become District Sections of the Institution of Gas Engineers. The status of the junior Associations was not entirely forgotten in the deliberations which preceded this reorganisation, although it was not really necessary at that stage to consider the position of the junior bodies in any great detail, for while the relationship between the senior and junior Associations was, and still remains, most cordial, in many cases the actual link amounted to little more than a formal affiliation of the junior to the senior body. As Mr. Clark pointed out at our last Annual General Meeting, there was a strong suggestion in some quarters that the junior Associations might fit into the general framework by becoming student sections each affiliated to its own District Section and in order that the true position might be placed on record a memorandum setting out the history, functions and activities of the junior Associations was prepared and submitted to the Institution of Gas Engineers by the Junior Joint Council.

The question of lowering the status of the juniors to that of student sections is still in the balance. Such a change is, in my opinion, not only unnecessary but wrong in principle since it can only lead to a large number of the industry's technical staff being deprived of a most important part of their training. The ten junior Associations having a membership of nearly 2,500 exist for one purpose which is to extend the general knowledge of their members and to supplement the training which they receive in the normal routine of their daily tasks. Such further education of the less senior members of the technical staffs of the gas industry can react only to the ultimate good of the industry and it would be undesirable to tamper with an organisation which is fulfilling so well a function which it is unlikely would be carried out so well under any other method of grouping.

If the work of the junior Associations can be performed more efficiently as a result of some reorganisation it is only fit and proper that the necessary changes in our constitution and methods should be made. No member of this Association could be at variance with such an ideal and we have no wish to carry on as we have in the past purely for the sake of maintaining a tradition.

It is difficult to imagine that any substantial gain would result from an alteration in the present constitution of our Association. It is an essential part of our organisation that we should plan our own programmes and run our own meetings. It is not suggested that we should disdain help or advice from whatever source, but there is no doubt that if the greatest advantage is to be obtained from the junior Associations, then the more they are left to work out their own salvation the better.

Education and Training

Although the gas engineering student is usually concerned with a somewhat narrow interpretation of education and confines himself almost entirely to the acquisition of such general knowledge as is required in his daily work, there is no doubt that he would benefit from a greater degree of education in its widest sense. As so many juniors have to complete their education, or vocational training, as part-time students, there is little hope that they will have sufficient time to broaden their outlook beyond the range prescribed by the education scheme of the Institution.

One shortcoming of far too many technically-trained men must receive attention, namely their inability to express themselves in words, a fault which becomes evident not only when answering examination questions but when presenting technical information for any purpose. This need for training in quality of expression cannot be over-emphasised and there are two small books which should occupy pride of place in the juniors' bookshelves: the first, 'Plain Words,' by Sir Ernest Gower, and the second 'The Presentation of Technical Information,' by R. O. Kapp.

The education scheme of the Institution which in 1923 amplified and to some extent supplanted the courses which had been held by the City and Guilds of London Institute for some 40 years has to give place to a new scheme which will come into operation in the next two years. The new scheme provides for an Associate Membership examination which will replace the present Ordinary and Higher Grade examinations and which, although involving more work on the part of the student will have the advantages that he will more easily be able to qualify for corporate membership of the other engineering Institutions and that, as his education will not have been so specialised, it will be easier for him to transfer from one associated industry to another.

In the opinion of a large section of the industry, however, insufficient attention is paid in the new syllabus to the chemical engineering aspects of the technology of gas production. Gas engineering is largely a chemical engineering matter and generally the civil and mechanical engineering problems are incidental. At a time when many of the universities are inaugurating courses for chemical engineers it is strange that the gas industry which is one of the most important of all chemical industries should tend to place the chemical engineering graduate somewhat at a disadvantage compared with his civil and mechanical engineering colleagues.

Whatever the course of training prescribed by the Institution of Gas Engineers the best works will be those built by civil engineers, with the machinery installed and operated by mechanical engineers, the electrical power equipment provided by electrical engineers, and the gasworks plant designed and operated by chemists and chemical engineers. Such a group of specialists, welded into a team and not operating as a collection of individuals each with the outlook peculiar to his training, will be an invaluable asset in furthering the development of our industry, and the earlier in their professional life the young men in each of these branches are thrown together, the more chance there is for some of our yet unsolved problems to be disposed of successfully.

Gasworks Chemists

I should like to voice a special plea for that most misunderstood body of men, the gasworks chemists. Much latent talent is allowed to lie dormant in the chemical laboratories of the gas industry. Few gasworks chemists are capable of applying fully their training in the fundamental principles of their science and their failure in this respect arises from two causes: (1) the reluctance shown in so many cases to entrust any chemist with responsibility; and (2) the tendency to regard chemists and gas engineers as different types of people whose views differ so fundamentally as to be eternally irreconcilable.

It may be that in many cases these views are justified but if this is the case does not the responsibility lie to a great extent at the door of the undertaking where the junior chemist received his initial training? If the simplest task that the laboratory assistant is called upon to do is properly related to works practice, will not a better type of gasworks chemist result—a man who can play his full part in maintaining the efficient working of the processes? Far too often the chemical laboratory is a receiving station for samples and the sole function of its inhabitants is to produce results of tests without any attempt to apply them to works conditions. Control of works processes and the appropriate laboratory tests should be so closely related as to be inseparable.

Post-war shortages of coal resulted in the hasty introduction of a number of schemes to augment plant outputs by cracking

* From Presidential Address to the London and Southern Junior Gas Association, June 2, 1950.

gas oil in ordinary carbonising units. Various methods were suggested, among which were processes for the controlled cracking of gas oil in an atmosphere of air and steam in horizontal retorts and cracking in an atmosphere of coal gas in the free space above the charges in intermittent vertical chambers. While usually it was impossible to assess with any accuracy the yields obtained from the gas oil, there is no doubt that in most cases the processes resulted in a substantial saving of coal. Only one oil cracking process has received any degree of publicity since that time and this employs a specially designed plant and was described by MacCormac in a paper to the Institution of Gas Engineers in 1948. The Gas Light and Coke Company's horizontal retort oil gas process depended upon the external heating of the reaction chamber to crack the products of a 'cool' flame which had already oxidised at a temperature not exceeding 400° C., some of the hydrocarbon molecules to less stable and more easily cracked aldehydes and peroxides. The new process burns a suitably preheated mixture of oil and air in a lagged reaction chamber to produce a gas consisting of 16% unsaturated hydrocarbons, 8% saturated hydrocarbons, 10% carbon monoxide and 60% nitrogen. This gas has a calorific value of 500 B.Th.U. per cu.ft., and a specific gravity of about 1 and appears to result from a different method of cracking the 'cool' flame products.

Perhaps the greatest saving of coal resulted from the increased use of gas oil in carburetted water gas plants. It had been usual to regard 500 B.Th.U. gas as the richest that could be produced efficiently in ordinary carburetting plants but investigation established that if the temperature of the cracking vessels was maintained by adding a proportion of steam with the air blast, the calorific value of the gas produced in both mechanically and hand-operated sets, could be increased to 570-600 B.Th.U. per cu.ft. without any difficulty. This replacement of coal therms by oil therms was possible only when ample supplies of a diluent gas were available or when circumstances permitted an increase in the calorific value of the gas for distribution.

Horizontal Retort Settings

A notable post-war contribution to horizontal carbonising practice was the development of an experimental horizontal chamber setting which formed the subject of a paper to the Institution of Gas Engineers at the 1945 Autumn Research Meeting. The intention was to design a horizontal carbonising unit which would increase the gas output from existing horizontal retort houses without major alteration to the normal ancillary plant. The results showed that the products obtained from the chambers were similar both in characteristics and quantity to those obtained in good horizontal retort practice, so that existing markets for coke and tar would not be affected adversely, while the throughput of coal per unit of area of ground space was increased by some 33% by substituting chambers for retorts. Since this paper was published, at least two installations of horizontal chambers have been built and further units planned, and the industry awaits with interest the publication in due course of the working results from these plants.

Another development in horizontal retort practice which has received considerable attention in the last few years is the scrubber standpipe. The introduction of this system has done more than any other recent modification to ameliorate working conditions in retort houses. There is no doubt that a modern retort house fitted with scrubber standpipes is easier to operate and gives gas yields at least as good as obtained with the older ascension pipe systems. There are certain operational details, however, which must receive regular attention if the best is to be obtained from the plant:

(1) A positive pressure should be maintained in retorts at all times.
(2) A constant and ample supply of liquor must always be available for the standpipe sprays.
(3) Regular and thorough augering of the off-take pipes is essential.

This latter is a simple job but one which must not be neglected if the flap valves are to remain tight.

The application of the principle of the recirculation of waste gas to horizontal retort practice received considerable attention in some quarters in the years immediately before the war and its use has been widely extended in the last five years. The general opinion appears to be that the recirculation of waste gas is advantageous in that it permits either a lower combustion chamber temperature to be operated with a standard carbonising period or a shorter carbonising period to be worked with standard combustion chamber temperatures. The first has the advantage of subjecting the refractory materials of the setting to lower temperatures which should result in an increased retort life; the second allows of a substantially increased gas output without subjecting the retort material to unduly high temperature. There are, however, several unknown factors in connection with the design and operation of settings using this principle, probably the most important being the effect of recirculation upon the fuel consumption, a subject which has been discussed somewhat vaguely by a number of writers without arriving at any very definite conclusions.

The design of a setting which will provide for the recirculation of the correct proportion of waste gas is another matter on which little definite information is available. It appears that settings using this principle are sometimes installed without due regard to the flue sizes, producer capacity, chimney draught, &c., and there have been a number of instances where recirculation has failed because of inadequacy of one or other of these factors. This is a subject which requires further investigation if the principle is to be used with any certainty of it functioning satisfactorily. Among the many variables which affect the design are setting dimensions, retort size, and producer size.

The throughput of coal per retort varies widely in different installations and as this determines the load on the producer, it is obvious that accurate information concerning this point will be essential also. The fuel consumption of horizontal retorts can usually be determined only by indirect methods; one seldom knows accurately the quantity of coal carbonised, the total amount of coke produced, or the amount of coke fed to the producer and it would seem that absence of accurate knowledge on these points sometimes leads to estimates of fuel consumption which tend to be somewhat optimistic.

The replacement of hand clinkered step grate producers by mechanical producers is a matter which has been considered in connection with nearly every new carbonising unit which has been built or planned since the war and producers of the latter type have been adopted in a number of cases.

The reluctance of the industry in general to change from one plant type to another is due to the lack of really reliable and unbiased information on the relative merits and disadvantages of both new and old plant although in some cases it may be necessary to change to mechanical producers because of the difficulty of obtaining suitable labour for clinkering the hand operated units.

Vertical Retorts

Improvements are still being made in continuous vertical retort design. Recent estimates indicate that nearly 45% of the gas made is produced in plants of this type which under favourable circumstances yield gas at constant calorific value and at regular rate, on the minimum ground space and with a lower fuel consumption than any other type of carbonising plant. Continuous verticals offer improved conditions of work for the plant operatives and produce a coke which has better ignition and combustion properties than that prepared by other high temperature methods.

Interesting experimental work carried out by what is now the North Thames Gas Board in continuous vertical retorts of approximately rectangular cross section has led to the conclusion that the overall shape of the retort and in particular the degree of taper in the major and minor axes has considerable effect upon the gas making results especially when using Durham run-of-mine coal. At two works coal charges in continuous verticals were cooled down so rapidly that the charges were preserved in their working condition. Detailed examination of these charges confirmed the irregular flow of Durham run-of-mine coal in retorts of 82 in. major axis.

Many voids were discovered and pockets of coal were found much lower down the retort than the end of the normal coal core. The importance of smooth coal travel in carbonising results was further emphasised in a paper given by Dr. Burns and Dr. Weston to the Institution of Gas Engineers in November, 1949.

Only about 6% of the gas produced in this country is made in intermittent vertical chambers which are capable of producing

a high yield of high calorific value straight coal gas from a wide variety of coals. The chambers can also be steamed but in practice most of these plants are operated to yield gas with a calorific value in excess of 500 B.Th.U. per cu.ft.

The possibility of recovering some of the sensible heat of the coke from intermittent carbonising plants has been the subject of considerable thought during the last 20 years and recently the question has been examined by a Working Group set up by the Ministry of Fuel and Power. This Committee collected evidence from both the operators and the manufacturers of dry cooling plants which have been working at various works in this country on the normal types of intermittent carbonising plant, *i.e.*, horizontal retorts, intermittent vertical chambers, and coke ovens. Certain general conclusions have been reached based on the present relationship between the cost of the plant, labour, &c., remaining substantially as at present and on the future availability of low grade fuel for steam raising.

The evidence indicated the necessity for providing stand-by steam raising plant, emergency wet quenching arrangements, or adequate stand-by dry cooling capacity and for the adoption of certain safety precautions in operating the plant, while the general opinion seemed to be that the dry-cooled coke was less easily ignited than wet-quenched coke but that breeze formation was not increased by dry cooling.

In view of the absence of any strong recommendation in favour of dry-cooling it would appear that there is little chance of extending its use under present conditions.

Carburetted Water Gas Production

Nearly one fifth of the gas made in 1945 consisted of water gas and most undertakings make some proportion of their output in the form of carburetted water gas. The exact role played by this type of gas varies from works to works but it is equally useful as a means for meeting both daily peak and seasonal peak demands and also for diluting high calorific value coal gas. Progress in the technique of producing carburetted water gas has gone on steadily, the chief developments of the last ten years being the production of high calorific value gas, and the application of the Lockheed principle for automatic operation. The former proved a useful method of increasing the thermal output from a works where carbonising plant was already operating at full capacity. In some cases, however, in order to take full advantage of the oil gas therms thus produced, it was necessary to increase the declared calorific value of the gas sold because no diluting medium was readily available.

With the increases in the price of gas oil, the oil gas therm tends to be more expensive than the coal gas therm so that for base load purposes at least, it is usually cheaper to make coal gas, but in certain circumstances considerable economies in general works operation may be effected by judicious use of carburetted water gas.

The use of preheated air blast and steam on carburetted water gas plants is to be investigated by the Gas Research Board who hope not only to improve the efficiency but also to obtain certain advantages in the practical operation of the plant.

Wet Purification

A number of contributions have been made within the last few years to published information dealing with the problems of gas cooling and the wet purification of gas. The latter subject was discussed by Pexton, Dougill, and Ravald with particular reference to the experience gained in the treatment of coke oven gas at Beckton works, although their paper also included details of schemes for modernising the wet purification plant associated with the horizontal retort houses at that works. The selection and design of gas condensing plant formed the subject of a paper given to the Southern Association of Gas Engineers and Managers by Francombe and Grant in May, 1949. Both papers are of particular interest at a time when so many new gas cooling and wet purification plants are projected or in some cases actually in course of construction. There are two main reasons for this demand for new plant, firstly, that plants are overloaded because of increases in gas output, and secondly because so much of the existing gas cooling and wet purification plant is both out of date and inefficient.

Line diagrams of five wet purification plants which are being installed by a well-known firm of gas plant contractors have received publicity. No two schemes are exactly alike and it would be interesting to know the reasons which led to the choice of the particular plant arrangements. The five schemes form a good cross-section of the various types of coal carbonising plant available and include horizontal retorts at Rotherhithe, coke ovens at Beckton, and continuous vertical retorts at Nottingham, Stockton, and Birmingham. The operational details of these wet purification plants would also form an interesting addition to published information on this somewhat controversial subject and it is hoped that this further information will be made available to the industry in due course.

Although two-stage cooling appears to be considered desirable when treating gas of high naphthalene content, the extent to which the gas is cooled in the first stage still remains a matter of opinion, one school of thought cooling to 65° F. in primary coolers equipped with reversing valves, the other not cooling beyond 90° F. to 95° F. in the first stage.

Electro detarrers are incorporated in all these schemes and although it is unusual to find an electro detarring installation on the suction side of the exhauster, it is interesting to find this arrangement proposed for the Swan Village works at Birmingham. The development of the electrical precipitation principle and its application to the removal of tar fog from fuel gas was the subject of a paper by K. W. Francombe at the 1949 Research Meeting of the Institution of Gas Engineers. This paper deals with all aspects of electro-detarring and with the discussion which it provoked formed a most useful addition to published information on the subject.

Removal of Hydrogen Sulphide

The removal of impurities from gas involves a number of processes most of which have been developed to a stage when they are continuous in operation and in many cases automatically controlled, the outstanding exception being oxide purification. This has survived as a batch process for nearly 100 years in spite of many attempts to replace it by some continuously-operating process based on the removal of the hydrogen sulphide by means of a liquid washing medium.

The first major modification to the usual method of purification in boxes at or near ground level was the introduction in 1938 of tower purifiers which have the following advantages over the box systems :

(1) Tower purifiers require less ground space.

(2) The time required to change the material in a tower is much less than that necessary for emptying and refilling a box purifier of similar gas purifying capacity.

(3) The operations of filling and emptying the containers can be spread over a period of three to four weeks so that fewer men are needed.

In fact, the ground space requirements are approximately halved, while the operation of removing the containers of spent material and replacing them by containers filled with fresh purifying material can be completed in 8-10 hours compared with at least three to four days with a box purifier holding the same quantity of oxide. Further, the spread-over of the work of emptying and refilling the containers has the advantage that instead of robbing the whole works of all its men for a short period, a much smaller number can be occupied for a longer time.

The original installation at Wandsworth has operated satisfactorily throughout the last 12 years and last autumn a second similar unit was put to work. Further installations are already at work elsewhere in the country, and several more are projected, some of which will have been designed to reduce still further the manual labour involved in emptying and recharging the containers and breaking the oxide.

This change from boxes to tower purifiers has not involved any fundamental change in the process so that the inherent disadvantages associated with dry oxide purification persist almost unaltered in tower purifiers.

Experience with various oxides in recent years suggests that really first class natural oxides are not so readily obtainable as before the war and this shortage of good quality bog ores and of materials like Lux has led to increasing use being made of various other types of synthetic purifying material consisting usually of iron oxide

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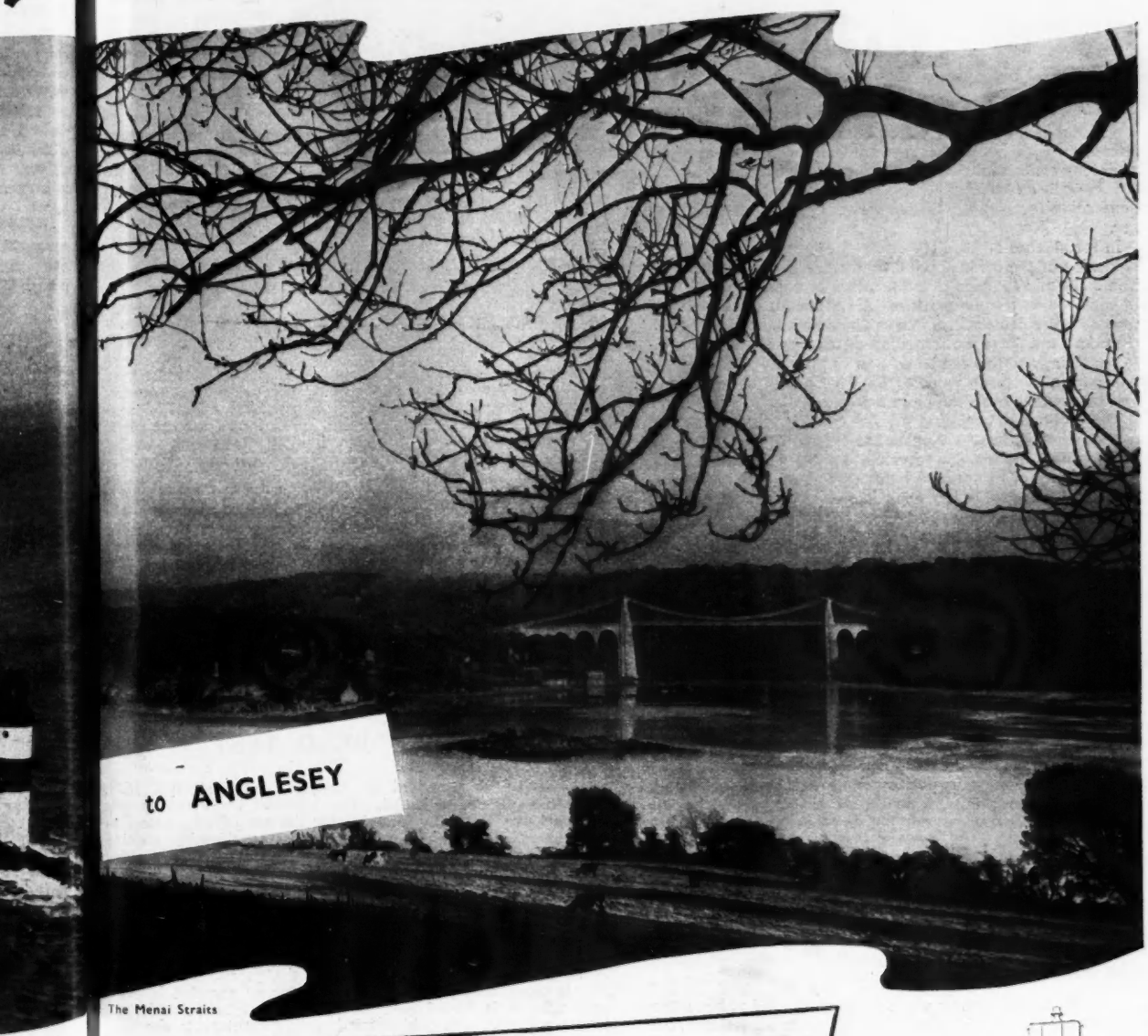

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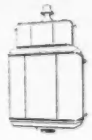

containing a greater or smaller quantity of active iron supported in a carrier such as wood dust or peat. Many of these are quite effective but usually the bulk density is low so that the weight of oxide charged is substantially lower than with bog ore and consequently the gas purifying capacity of existing plant tends to be reduced.

Dry Oxide Process

The dry oxide process has also been the subject of considerable investigation by the Gas Research Board who have paid particular attention to the question of the hardening of oxide in purifiers. They have confirmed that wide variations exist in both performance and operating conditions at various works and that there is no dominating factor which determines whether oxide will cake or not.

In the absence of tar, light oils, and other extraneous materials hardening of the oxide appears to depend upon the migration of iron oxide and sulphide in the presence of moisture to the points of contact between the particles. A continuous cellular structure covered with a dense skin of iron sulphide consolidated with sulphur then develops. It is the formation of the dense skin which leads to hardening and this can be delayed or prevented by maintaining moisture in the oxide by controlling the use of revivification air and by avoiding over-heating in the boxes.

The problem of replacing the dry oxide by some wet method for removing hydrogen sulphide has been attacked with renewed vigour within the last few years not only because of the inherent disadvantages of operating a batch process on such a large scale but also because it is becoming increasingly difficult and costly to obtain labour suitable for the heavy work of emptying purifiers, and with present-day high gas throughput it is frequently impossible to produce a saleable spent oxide so that the fouled material has often to be dumped.

The claims of reliability, simplicity, and cheapness made for and substituted by the dry oxide process over a period of many decades no longer hold to the extent that they did and conditions for the introduction of a continuous process are probably more favourable than ever before. The change would ease the position with regard to spent oxide, would reduce labour problems, while it has been suggested that with a plant of reasonable size, the capital cost of a liquid plant might be less than that of a dry oxide plant.

Opinions are divided as to the best way of using a liquid purification plant, some believing that it should be used solely to ease the burden on the existing dry purifiers while others hold that complete removal of hydrogen sulphide should be aimed at, the liquid purification plant replacing and not supplementing the oxide boxes or towers. In the first scheme the absorption towers would be placed before and in series with the existing purifiers, no attempt being made to remove hydrogen sulphide completely. An alternative method would be to reserve the liquid purification plant to deal with seasonal peak loads, just as a carburetted water gas plant is used to make gas to meet these seasonal peaks.

The Manchester Process

The Manchester process which is being installed at a number of works has been the subject of several papers to the technical Press, a comprehensive survey being given in a paper to the Midland Junior Gas Association by Priestley. In this process hydrogen sulphide is absorbed in ammonia or sodium carbonate solution to form an alkali hydrosulphide. This in turn reacts with ferric hydroxide which acts as the oxygen carrier, to form ferric sulphide. In the oxidation stage, air is blown through the solution and the ferric sulphide is oxidised to ferric hydroxide and free sulphur.

The basic factors which have been studied in designing plant for the process can be grouped under five headings: (1) Absorption; (2) oxidation; (3) sulphur recovery and disposal; (4) disposal of effluents; (5) continuity of operation when purifying to Gas Referees' standards.

Preliminary reports have already been published giving the operational details and costs of the original working scale plant at Manchester which deals with 2-3 mill. cu.ft. of gas per day and is operated to effect purification to Gas Referees' standard. Four other installations which are in the course of construction should provide data extending over a variety of conditions and the future of dry oxide purification will probably depend upon the results obtained from these plants.

STEAM AHEAD

Steam utilisation is a branch of fuel technology which is rapidly establishing itself as one of the primary aids to efficiency. In much of the progress in this field there is to be discerned the guilding hand and encouraging influence of the Ministry of Fuel and Power, and it is cause for some satisfaction that the considerable development of technical education in steam usage has this Ministerial support. Until a few years ago, there were no courses at technical colleges or universities and little written in text books on steam utilisation as a specific subject. Today the problem is somewhat easier. Lectures and short-term courses on steam utilisation are held regularly at several colleges, and last year one college started a three-year course; in addition, lectures on transmission and utilisation of steam for power and process have been included in University refresher courses for works and plant engineers. Concurrently with the development of technical education, the Ministry has published various technical bulletins and a text book, *The Efficient Use of Steam*, of which, it is stated, 10,000 copies have been sold. In the field of research, and to make readily available—and understandable—information obtained during war-time circumstances, a Steam Research Panel was set up. It was decided that seven subjects were worthy of immediate investigation, namely, heat transfer from superheated steam; effect of steam velocity on heat transfer; effect of material velocity on heat transfer; effect of non-condensable gases on heat transfer in various types of plant; drop condensation and nucleate boiling; formation of an accurate and simple method of sampling steam and determining its moisture; and heat transfer by direct injection. To date two reports have been prepared—*The Effects of Non-Condensable Gases on Heat Transfer from Condensing Steam*, and *The Effects of Steam Velocity on Heat Transfer from Condensing Steam*—and a third report on heat transfer from superheated steam is being prepared. Work along these lines has, as the May issue of *Fuel Efficiency News* suggests, led to a new outlook on steam utilisation, and for a detailed account of this subject readers are referred to a reprint of 'Steam Utilisation,' which constituted Progress Review No. 5, in the *Journal of the Institute of Fuel*, and is obtainable from the Institute at 18, Devonshire Street, Portland Place, W.1, price 2s.

SIMPLE BEND TEST

A new British Standard for Simple Bend Test (B.S. 1639: 1950) has just been issued. The material contained in this standard was originally intended for the use of committees of the Institution as guidance in preparing specification requirements for a simple bend test, but as there were indications that a wider dissemination would be appreciated, it was decided to publish it in the general series of British Standards as 'Notes on the Simple Bend Test.' Although the simple bend test is widely used to give a ready qualitative assessment of the ductility of a metal, it is not generally appreciated that certain features of the test, probably because of its simplicity, have to be given due consideration when the precise form of the test is being decided, or when the value of the test is being assessed. It is hoped that these notes will be of assistance in this respect. The publication is complementary to the bend test clauses of B.S. 485—'Tests on Thin Metal Sheet and Strip (not exceeding 0.128 in. (10 S.W.G.) in thickness),' but it is recommended that the provisions of that standard should be followed when testing thin metal sheet and strip. It does not, however, refer to composite or welded metals. Copies may be obtained from the British Standards Institution, 24, Victoria Street, S.W.1, price 2s., post free.

Industrial output in the United Kingdom recovered during May, following the decline in April as a result of the Easter holidays, the provisional index number (1946=100) prepared by the Central Statistical Office rising by seven points to 142. The index is thus only one point below the record set up in March. The corresponding figure for the same month a year ago was 129. The index for mining and quarrying during the month is provisionally placed at 118, which compares with 109 in April, and 113 in May last year, and 102 in the same month of 1947. Production in the manufacturing industries is put at 149, a rise of 10 points over April, and of 40 points since May, 1947.

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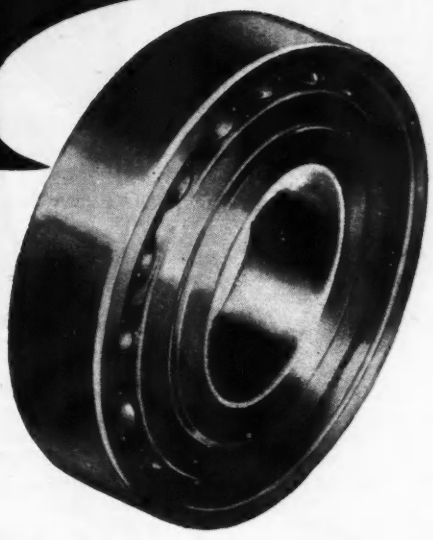

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The Wakefield Industrial Lubrication Service offers you specialised advice on all oil problems. Efficient lubrication is not only a matter of regular replenishment with any given type of oil. Efficient lubrication involves a complete study of an engine's requirements including the type of work it has to do, the speed at which it does it and many other factors. The Wakefield Industrial Lubrication Service is equipped to tackle every sort of oil problem. Wakefield engineers will advise you on the best oil for your purpose and on its method of use —this advice is freely available to all who wish to profit from it.

OIL FOR INDUSTRY

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100 years ago

The House of Commons (1850)

Excerpt from "The SCOTSMAN," Wednesday, January 16, 1850.

MR. Barry's House of Commons, built in 1850 and blitzed in 1941, was designed 'as small as possible for the requirements of the House.' There is no record of the verbiage output of this seat of legislature (equalled, perhaps, only in the Tower of Babel!), but as far as we are concerned we claim with justifiable pride that the modern A. & M. Meter is as small as possible commensurate with the consistent and accurate measurement of gas in large quantities.

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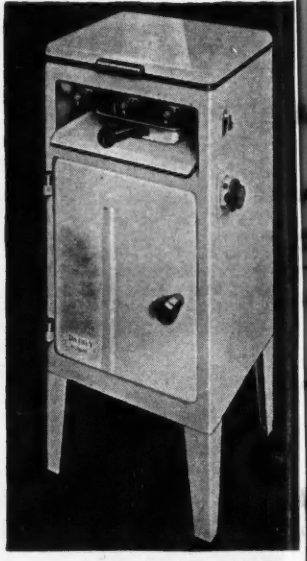
For small Kitchens and Flats...



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MINOR

This efficient little cooker of large capacity is made especially for small kitchens and flats.

Its cast-iron construction ensures durability and low maintenance cost.

For hire purchase or for simple hire The 'Dainty' Minor is ideal.

Approved and adopted by leading gas boards.

Leaflet fully describing this efficient, attractive and economical cooker will gladly be sent.

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JAMES R. THOMSON & CO., LTD., 10 Blythswood Street, Glasgow, C

PUBLISHERS' NOTICE

The "Gas Journal" is published every Wednesday, price 1/-; by post 1/2d.

Subscription Rates: Home and Empire :- 45/- per annum; Foreign :- 52/- per annum. (Both payable in advance.) A copy o the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/6 per line (approx. 7 words) - minimum charge 7/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep x 7" wide; block screen 120.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS OFFICE: 10, Union Street, Birmingham.

NORTHERN MANAGER: W. Q. Foster, 33, St. Helens Road, Harrogate. 'Phone: Harrogate 84291.

WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C.4.

Telephone: CENtral 2236-7. Telegrams: Gasking, Fleet, London.

Domestic Utilisation of Gas

By NORMAN S. SMITH, B.Sc., Assoc.M.Inst.Gas E., and R. N. Le FEVRE, M.Inst.Gas E., A.I.Mech.E.

Since it was first published in 1932, *Domestic Utilisation of Gas* has been regarded as a standard text book. Continued demand has necessitated its reprinting and periodical revision. During the post-war period in particular great progress has been made in the development of appliances and the efficient utilisation of gas. Moreover, there is a new and large influx of students today, needing just such information as *D.U.G.* provides. To meet these demands *Gas Service* has arranged to publish *Domestic Utilisation of Gas* completely revised and brought up to date, as a series of articles, the first of which appears in the August issue. It is anticipated that the response will be considerable, and those interested in obtaining copies for themselves or their staff are urged to inform the Subscription Manager of their requirements.

published in —— **Gas Service** —— *each month*

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which has stood the test of 70 years and rapidly absorbs 60% Sulphur (wet basis). Send your enquiries to

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APPOINTMENTS VACANT

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HOME SERVICE ADVISER.

APPLICATIONS are invited for the above position. Candidates should be qualified in domestic science and be experienced in the use of domestic cooking and heating appliances and in organisation of cookery demonstrations, lectures and district home service calls.

The commencing salary will be within the range of £360-£424 per annum.

Applications, stating age, qualifications and experience, together with *copies* of two recent Testimonials, should be forwarded to the undersigned within 14 days from the date of this advertisement.

The successful candidate may be required to pass a medical examination and to subscribe to such scheme of superannuation as the Board may adopt in the future.

J. G. O. DRAKE,
General Manager.

Princess Street,
Blackpool.
August 14, 1950.

EASTERN GAS BOARD

NORWICH DIVISION.

GROUP ACCOUNTANT.

GREAT YARMOUTH.

APPLICATIONS are invited from suitably qualified accountants for the above appointment which will involve responsibility for the supervision of all accounting work connected with the nine undertakings in this group.

The salary will be within Grade XII (£645-£770) of the National Salary Scale of the Gas Industry, the commencing salary being in accordance with the qualifications and experience of the candidate appointed.

The successful candidate will be required to pass a medical examination and the appointment will be subject to the provisions of such a superannuation scheme as may be adopted by the Board.

Applications, stating age, experience, qualifications and present appointment, together with two recent Testimonials, should be sent to the undersigned not later than September 7, 1950.

R. A. WESTON,
Divisional General Manager.

Bishop Bridge Works,
Norwich.

EASTERN GAS BOARD

NORWICH DIVISION.
SENIOR CLERK,
GREAT YARMOUTH.

APPLICATIONS are invited from suitably qualified clerks for the above appointment. Candidates should have had several years experience in the general day-to-day work of a medium sized undertaking, with special experience of gas rental work.

The salary will be within Grade VII (£450-£530) of the National Salary Scale of the Gas Industry, the commencing salary being in accordance with the qualifications and experience of the candidate appointed.

The successful candidate will be required to pass a medical examination and the appointment will be subject to the provisions of such a superannuation scheme as may be adopted by the Board.

Applications, stating age, experience, qualifications and present appointment, together with two recent Testimonials should be sent to the undersigned not later than September 7, 1950.

R. A. WESTON,
Divisional General Manager.

Bishop Bridge Works,
Norwich.

EASTERN GAS BOARD

CAMBRIDGE DIVISION.
CAMBRIDGE DISTRICT.

APPLICATIONS are invited for the position of JUNIOR TECHNICAL ASSISTANT to Cambridge District Gas Undertaking.

In addition to experience of carbonising and carburetted water gas plants, applicants must have a good knowledge of routine chemical testing necessary on modern gasworks.

The post is graded in accordance with Grade IV of the National Joint Council for Gas Staffs Salary Scales and the salary will be within the range of £360-£420 per annum, the commencing figure being dependent upon experience and qualifications.

Applications, stating age, qualifications, training and experience, together with the names of three persons to whom reference may be made should reach the undersigned on or before August 23, 1950.

E. H. WINCH,
Engineer and Manager.

Eastern Gas Board,
(Cambridge Division),
Cambridge District,
Gasworks,
Newmarket Road,
Cambridge.

(Classified advertisements continued on Supplement 4)

APPOINTMENTS VACANT (ctd.)

EAST MIDLANDS GAS BOARD

SHEFFIELD AND ROTHERHAM DIVISION

DIVISIONAL COST ACCOUNTANT.

APPLICATIONS are invited from qualified persons for the appointment of a DIVISIONAL COST ACCOUNTANT at a salary within the range of £695 to £770 per annum.

Applicants, preferably, but not essentially, with experience within the gas industry, should be fully conversant with modern mechanical cost accounting.

The appointment will be subject to such superannuation scheme as may be adopted by the Board, and the successful applicant may be required to pass a medical examination.

The appointed person will be required to reside in Sheffield.

Applications, stating age, qualifications and giving full details of experience, must reach the undersigned not later than August 24, 1950.

E. H. HARMAN,
Divisional General Manager.

Commercial Street,
Sheffield, 1.
August 3, 1950.

WALES GAS BOARD

LLANELLY UNDERTAKING.

FOREMAN GAS FITTER.

APPLICATIONS are invited from suitably qualified persons for the above appointment.

Candidates should have received first class training and experience in modern gas fitting practice, and be capable generally in supervising the fitting department. He should be fully conversant with all modern domestic and industrial appliances and maintenance schemes in the fitting department. A sound knowledge of general distribution practice with final City and Guilds Certificate in Gas Fitting and/or Technology of Gas Supply will be an advantage.

Salary will commence at the rate of £390 per annum and terms and conditions will be governed by the appropriate Gas Industry agreement.

All salary conditions will be governed by any future grading agreements reached on a national basis for intermediate grade employees.

The appointment will be subject to satisfactory medical examination.

Applications, stating age and giving full particulars of experience, together with the names of two referees to be forwarded to the undersigned not later than Thursday September 7, 1950.

A. PICKARD, M.INST.GAS E.,
Engineer, Manager and Secretary.

Gas Offices,
Murray Street,
Llanelly.

WALES GAS BOARD

KIDWELLY UNDERTAKING.

APPLICATIONS are invited from suitably qualified and experienced persons for the position of ENGINEER AND MANAGER of the Kidwelly Undertaking of the Wales Gas Board.

The undertaking is in process of expansion from gas sales of 10 mill. cu.ft. per annum to 30 mill. cu.ft per annum due to industrial load and applicants must be qualified to deal with all aspects of this development.

Applicants will be required to give evidence that they have had sound experience in the operation and control of horizontal retort settings and gasworks plant to produce gas of constant composition. Experience in low pressure distribution and the development of domestic sales will be a desirable qualification.

The commencing salary will be £475 per annum plus a fixed quantity of free solid fuel and gas. A house will be available at a reasonable rental.

Applications, giving details of age, qualifications and experience, together with the names of two referees, should be submitted to the undersigned not later than August 26, 1950.

C. B. MAWER,
Secretary.

Wales Gas Board,
1-2, Windsor Place,
Cardiff.
Cir. No. 79(S).

DRAUGHTSMAN with sound knowledge of gasworks and allied chemical plant design required. Age 35 or upwards. Pension scheme. Permanent position to suitable applicant.

Fullest details of experience, age and salary, to R. & J. DEMPSTER, LTD., Gas Plant Works, Manchester, 10.

COKE OVEN MANAGER required for large industrial works in India. Candidates should possess sound training and experience on coke oven and by-product plant and have preferably held similar post.

Salary equivalent to £130 per month plus free unfurnished quarters. Four year renewable agreement. Provident fund. Free medical attention.

Applications, giving full particulars of training and experience and stating age, to D.T.B., c/o Simon-Carves, Ltd., Cheadle Heath, Stockport.

FOREMAN ERECTORS for gasholders required immediately.

Apply, stating experience, &c., to ROBERT DEMPSTER & SONS, LTD., Elland, Yorks.

SALES REPRESENTATIVES required by well-known firm of gas plant engineers for areas: (*a*) Scotland and North of England, and (*b*) Midlands and South of England.

Applicants should possess sound knowledge of all types of gasholders, purifiers, condensers, washers and ancillary equipment. Knowledge of carbonising and mechanical handling plant will be an advantage.

The appointments will be permanent and pensionable.

Applications, stating age, experience and salary required, to No. 9924, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

APPLICATIONS are invited for position of MAINTENANCE ENGINEER for large engineering works in South Yorkshire. Applicants should be about 40 years of age and must have practical experience of steam boiler plants, hot water heating installations, air compressors, heavy machine tools, mechanised foundry plant, electric overhead, mobile and derrick cranes. Good organising ability essential.

The position would be superannuated.

A house is available for successful applicant.

Apply in writing, stating age, education, qualifications and experience, to No. 9923, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

NORTHERN GAS BOARD

APPOINTMENT OF
DIVISIONAL GENERAL MANAGER.

APPLICATIONS are invited for the post of GENERAL MANAGER of the Board's Sunderland Division, comprising the Sunderland unit with six secondary units.

The person appointed will be required to control all activities of the Division, engineering, commercial and administrative under the direction of the Divisional Management Committee, of which he will be a member.

Salary £1,900 per annum.

Closing date for applications, to be addressed to the undersigned, September 16, 1950.

J. F. JACKSON,
Secretary.

30, Grainger Street,
Newcastle-upon-Tyne, 1.

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WALES GAS BOARD

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TENDERS are required for the supply and delivery of approximately 800 lineal yards of UNCLIMBABLE FENCING at least 6 ft. 6 in. high above ground complete with two double leaf gates 12 ft. wide and one single gate 6 ft. wide.

Full particulars of the proposed fencing and time required for delivery must accompany the tender.

For further particulars apply to J. F Rust, M.INST GAS E., General Manager and Engineer, Gas Offices. Mill Street, Newport, Mon.

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GAS ACCOUNT CALCULATORS

SUPPLIED either by Price per Therm or Thousand, for any specified Calorific Value, in book form, office charts, or pocket charts for Meter Inspectors, printed in clear type. Write for particulars to F. H. WAKELIN, LTD., Calculator Specialists, 35 WHEELER STREET, BIRMINGHAM.
'Phone: Northern 0989. 'Grams: Reckoner B'ham.

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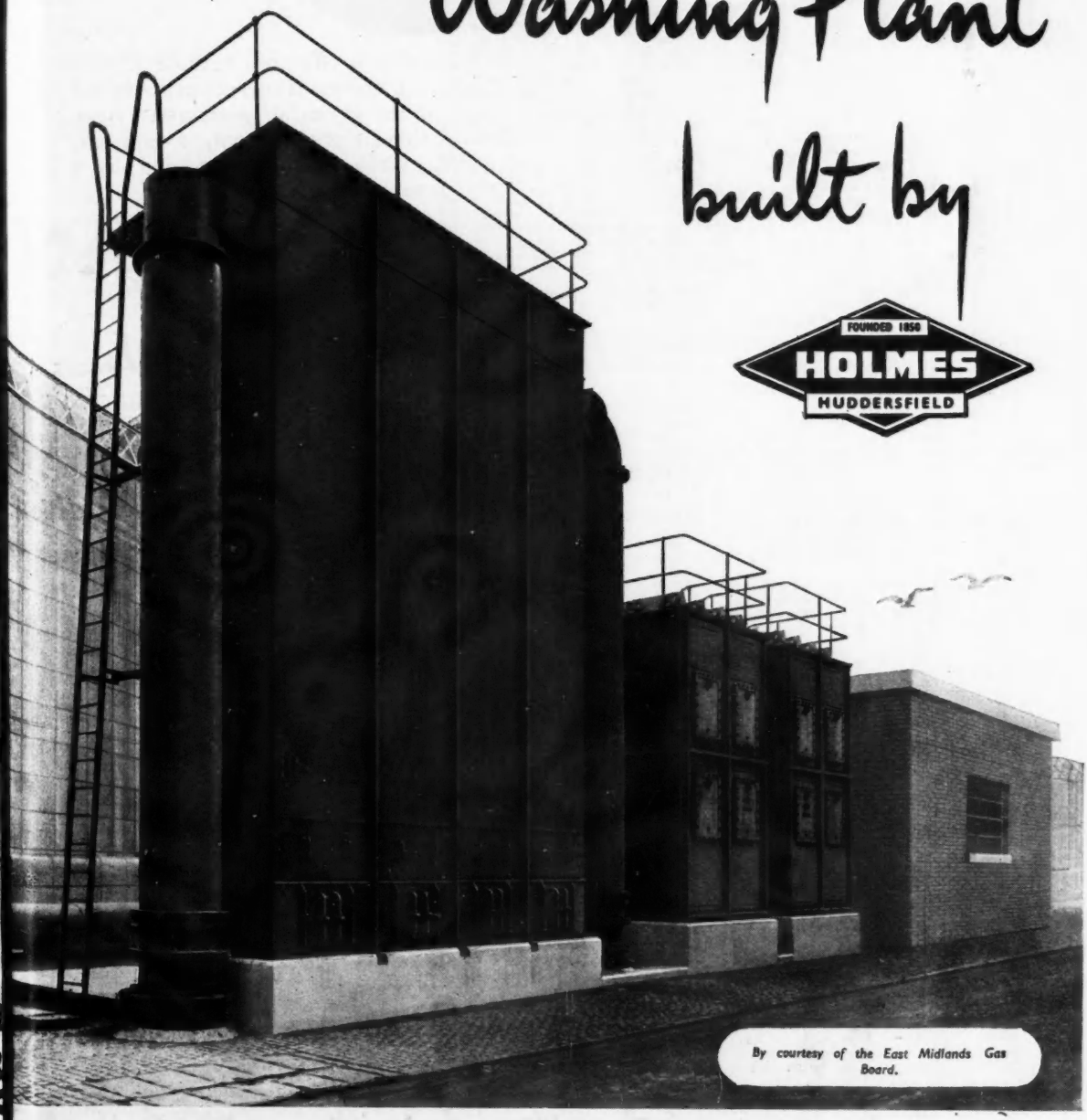

By courtesy of the East Midlands Gas Board.

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Every gas furnace using air blast should be fitted with this control!

This control ensures maximum efficiency because it correctly mixes gas and air and maintains correct proportions irrespective of changes in the gas or air pressures. Also, with this control reasonable air pressure only is required, which, if not already available, can be provided by a centrifugal fan. Many thousands in use.

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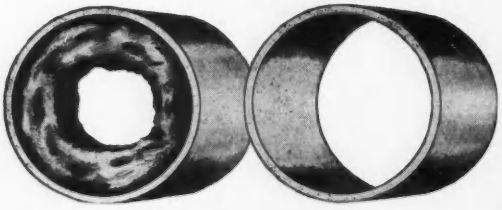

The Horizontal Boring Method employed is 100% effective in cleaning mains, a considerable length being treated at one time with hardly any interruption to the supply of gas.

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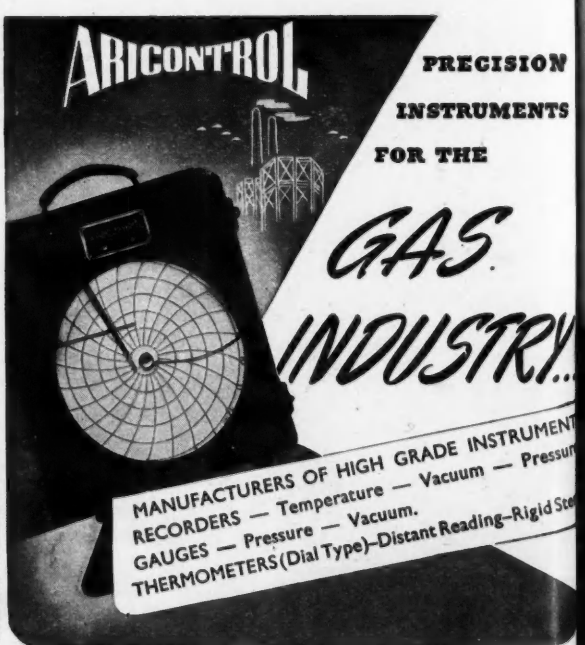
Phone: TOTtenham 2665-8 *Telegrams: Unwater, Southtot, London*



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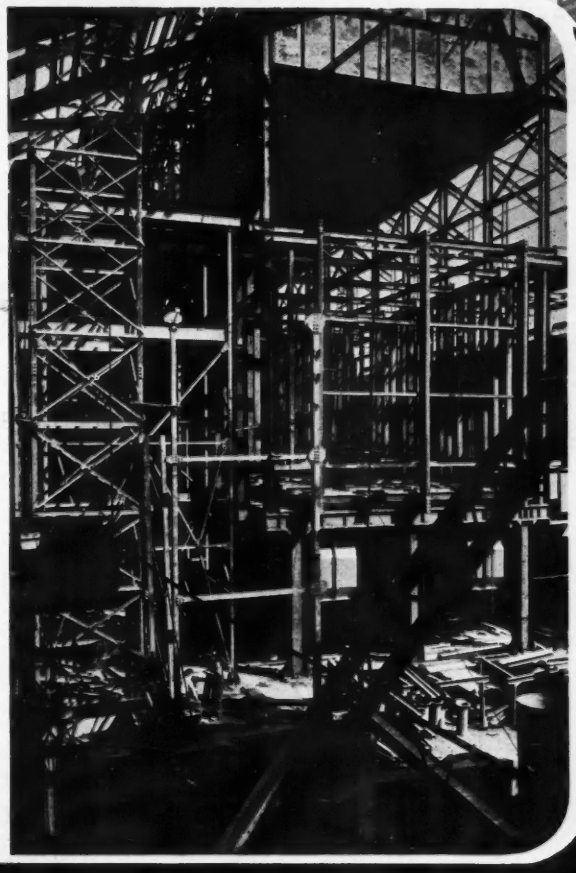

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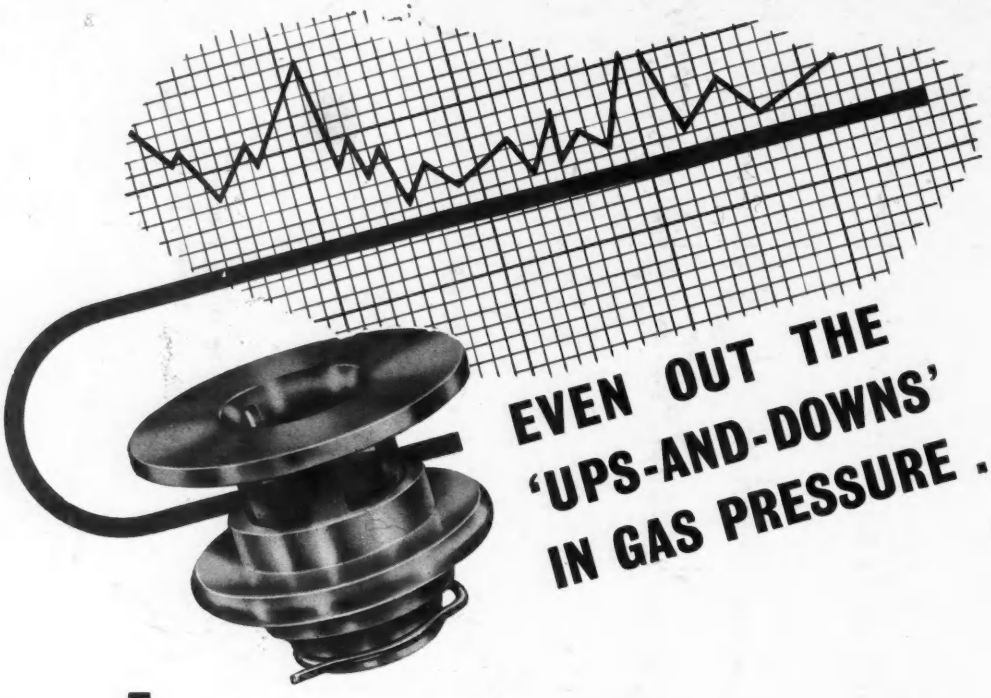

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THE cost of maintaining Instantaneous Gas Water Heaters is ***SUBSTANTIALLY REDUCED*** and the User assured of a better hot water service by installing EWART geysers for the following reasons :—

- **GOVERNOR** A volume governor is provided as an integral part of ***MULTI-POINT AND SINK GEYSERS.***
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Scottish Agents : HALE, HAMILTON & CO., LTD., 104 West Campbell Street, GLASGOW, C.2.
Northern Ireland : V. A. WHITE & CO., 18/20 Church Street, BELFAST.

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